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FRONTISPIECE.

Fig 1

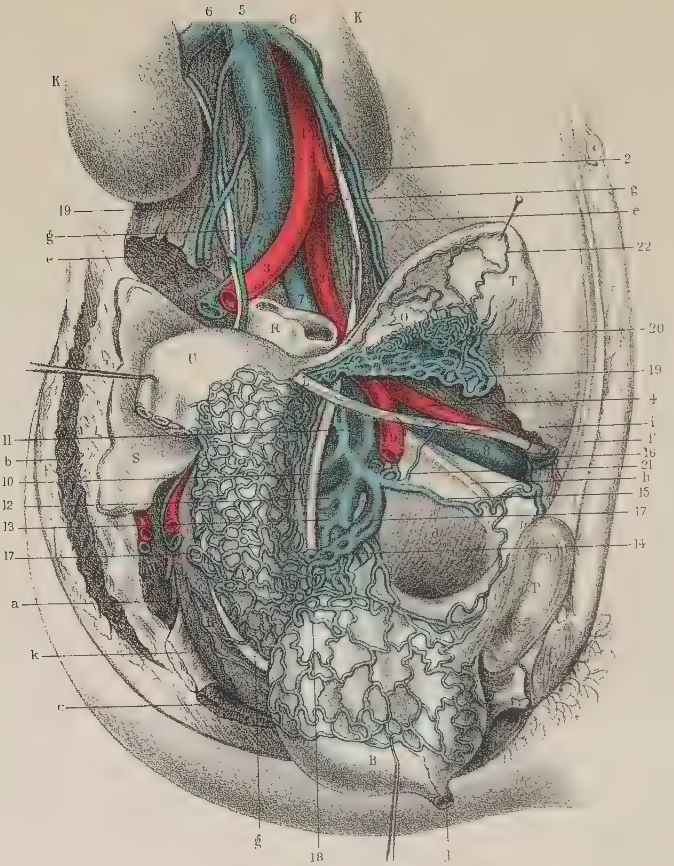
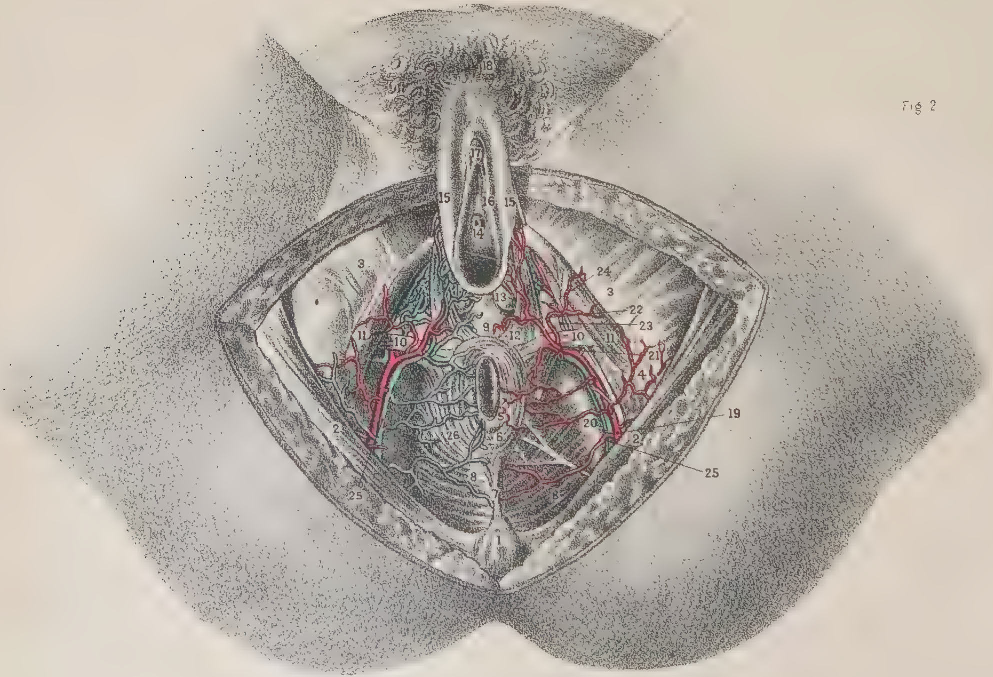


Fig 2



GEO S HARRIS & SONS, LITH PHILA

DESCRIPTION OF FRONTISPIECE.

SIDE VIEW OF THE FEMALE PELVIS (FIG. 1).

B. Bladder (turned down).
R. Rectum.
L. Round ligament.
U. Uterus.
O. Ovary.
V. Vagina.
S. Sacro-iliac synchondrosis.
K. Kidney.
T. Fallopian tube.
P. Pubic symphysis.
a. Pyriformis muscle (cut).
b. Gluteal muscles.
c. Coccygeus muscle.
d. Obturator internus.
e. Psoas magnus.
f. Linea alba.
g, *g*. Ureters.
h. Obturator nerve.
i. Internal abdominal ring.
k. Great sacro-sciatic ligament.
1. Abdominal aorta.
2. Inferior mesenteric artery.
3, 3. Common iliac arteries.
4. Left external iliac artery.
5. Vena cava inferior.
6, 6. Renal veins.
7, 7. Common iliac veins.
8. External iliac vein.
9. Internal iliac artery (cut).
10. Gluteal vein.
11. Ilio-lumbar vein.
12. Lateral sacral vein.
13. Sciatic vein.
14. Pudic vein.
15. Obturator vein.
16. Epigastric vein.
17. Uterine veins.
18. Vesico-vaginal veins.
19. Ovarian veins.
20. Bulb of the ovary.
21. Vein to round ligament.
22. Fallopian veins.

FEMALE PERINEUM AND ISCHIO-RECTAL REGION (FIG. 2).

1. Coccyx.
2. Gluteus maximus.
3. Fascia lata, inserted into pubic arch.
4. Tuberosity of ischium.
5. Internal sphincter ani.
6. External sphincter ani.
7. Attachment of sphincter ani to coccyx.
8. Levator ani, forming floor of ischio-rectal fossa.
9. Perineum.
10. Transversus peronei muscle.
11. Erector clitoridis.
12. Constrictor vaginæ.
13. Glands of Bartholini.
14. Urethral opening.
15. Labia majora.
16. Labia minora.
17. Clitoris.
18. Mons Veneris.
19. Internal pudic artery.
20. External hemorrhoidal artery. (The three arteries of this name are shown, the middle one only being marked.)
21. Superficial perineal artery. (Supplying anus, perineum, vaginal lips, and erector clitoridis.)
22. Transversus peronei artery.
23. Deep branch of internal pudic artery.
24. Artery of the bulb (arteria bulbosa).
25. Internal pudic vein (common).
26. External hemorrhoidal vein. (Other branches of the same vessel not marked.)

AN AMERICAN
TEXT-BOOK OF GYNECOLOGY,

MEDICAL AND SURGICAL,

FOR

PRACTITIONERS AND STUDENTS.

BY

HENRY T. BYFORD, M.D., J. M. BALDY, M.D.,
EDWIN B. CRAGIN, M.D., J. H. ETHERIDGE, M.D.,
WILLIAM GOODELL, M.D., HOWARD A. KELLY, M.D.,
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EDITED BY

J. M. BALDY, M.D.

WITH 360 ILLUSTRATIONS IN TEXT, AND 37 COLORED
AND HALF-TONE PLATES.

PHILADELPHIA:
W. B. SAUNDERS,
925 Walnut Street.
1894.

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TO THE

MEDICAL PROFESSION OF AMERICA,

BY

THEIR CO-WORKERS,

THE AUTHORS.

10146

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PREFACE.

THE rapid and progressive advances in the science and art of Gynecology during the past dozen years have created an almost constant necessity for the revision of works on this subject. For this reason, and for the purpose of presenting gynecological surgery and treatment as it is practised in America, the country of its birth and of its most substantial improvements and progress, the present text-book has been prepared by American authors, all of whom are teachers of this branch of surgery in the leading medical schools and hospitals. It is thoroughly practical in its teachings, and is intended, as its title implies, to be a working text-book for physicians and students. Many of the most important subjects are considered from an entirely new standpoint, and are grouped together in a manner somewhat foreign to the accepted custom. Several new chapters have been added, such as Technique and After-treatment, it being hoped that by this presentation of the subject the student might the more readily be aided in an intelligent understanding of their details. Illustrations have been depended upon in great measure to demonstrate and explain the anatomy of the parts considered—a method of dealing with the subject which has relieved the text of much irrelevant and cumbersome matter.

The work embodies as nearly as possible the combined opinions of all the authors, although it is to be understood that each individual author must be free from absolute responsibility for any particular statement: especially is this so for the reason that the Editor has endeavored by adding to and subtracting from the text to render it as uniform in its statements as possible.

All extraneous matter and discussions have been carefully excluded, and the attempt has been made to allow nothing unnecessary to cumber the text, which is brought fully up to date at every point.

The subject-matter of this work has been enforced by illustrations wherever opportunity presented. A large proportion of these illustrations are original, and are mostly reproduced from photographs or from fresh specimens. A considerable number of woodcuts and several half-tone and colored plates have been taken from other authors, and are credited to them in the List of Illustrations.

The Editor desires to thank Dr. Frank W. Talley for his careful revision of the proof-sheets, for his preparation of the Index, and for his valuable aid in other ways, and to express appreciation of the efficient and ever-ready co-operation of Mr. W. B. Saunders.

J. M. BALDY.

PHILADELPHIA, Dec. 1, 1893.

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AN AMERICAN
TEXT-BOOK OF GYNECOLOGY.

EXAMINATION OF THE FEMALE PELVIC ORGANS.

In making an examination for disease of the female pelvic organs, the first thing for a physician to do is to acquire the confidence of the patient. The next thing is to possess an adequate knowledge of all known physiological and pathological conditions of these organs. An untidy office, a dirty hand, a careless manner, and a rough demeanor are as inimical to his success as a lack of knowledge and training in gynecology. The fear of the patient that she may become infected by filth, hurt by manipulation, or neglected through carelessness is often sufficient to deter her from undergoing treatment that is, under the most favorable circumstances, a distasteful and onerous undertaking. He should remember that the patient comes prepared to sacrifice all preconceived notions of modesty to his dictum, and does it with the full belief that he possesses the refinement of a gentleman and the acquirements of a scholar.

He must not be impatient if she commences talking first of other parts of the body, avoids complete explanations of certain symptoms, or is a little dilatory in submitting to the necessary examinations. On the other hand, he should never abate in his deference to a woman who, having once submitted to gynecological treatment, conducts herself toward him with that familiarity and trustfulness which the sacredness and dignity of his calling inspire.

If she chooses to talk, it is well to listen attentively to the recital of her ailments until satisfied that they are of pelvic origin, when the physician may commence by appropriate questions to obtain a systematic description of her case. The data should be entered in a case-book in somewhat the following order: Name; age; whether married or not, and if so, whether more than once; the number of confinements, with dates of first and last, and number and dates of abortions; her occupation and habits, whether sedentary or active; age of first menstruation, and how regular since then; whether menstruation is painful or not; when the pain commences and stops, and where it is felt and what its character; the length of time the flow lasts, whether profuse and clotted, or scanty, or prolonged by recurrence after cessation for a few hours or days; amount and character of discharge from vagina between the menstrual periods; the condition of nutrition as seen by the appearance of the tongue, conjunctiva, and skin, and the state of the nervous system.

Having obtained these facts, and others that may be acquired during the questioning, he will have a foundation upon which to construct an accurate diagnosis. The patient may be allowed to relate her special symptoms, or he may inquire for the various ones that accompany the disorders under consideration, or may ask for special symptoms of whatever disease the knowledge already acquired leads him to expect.

He should always differentiate carefully between conditions which are of such gravity and long standing as to call for an examination, and those which are temporary and may be relieved by general treatment.

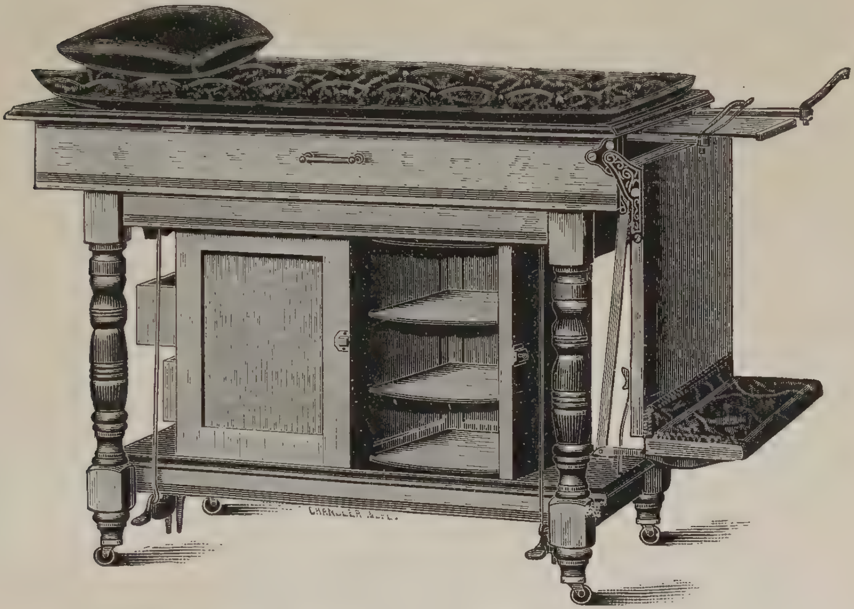
The functions of the kidneys, bladder, bowels, and rectum should be inquired into, as well as the effect of exercise or quiet upon her symptoms. A qualitative and quantitative analysis of the urine and an examination of the heart should be made in very fleshy or anemic patients, and also in those presenting symptoms referable to the abdomen and chest.

PREPARATIONS FOR AN EXAMINATION.

Although the examination in most cases can be made without preparation of the patient and at the first interview, yet when there is any difficulty in arriving at an accurate diagnosis it is well to have her return upon another occasion properly prepared. Such preparation should consist in mild purgation upon the day previous, and a soapsuds enema on the morning of the examination. The diet on the same day should be light, and the bladder evacuated immediately before the visit.

When the examination is made at the patient's house, a sofa without arms may be drawn near a window, with stools placed at the end for the feet, or a table may be used with chairs for the feet.

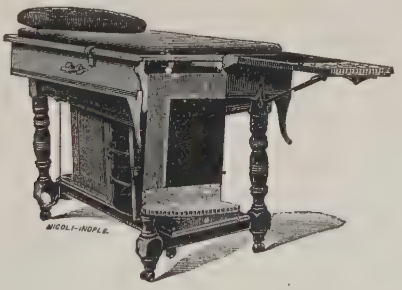
FIG. 1.



The Allison Gynecological Table, arranged for Dorsal Position.

When more convenient, the patient may sit on a pillow placed at the edge of a bed and lie back with the feet on chairs placed two feet apart. The corset and waist-bands should be loosened.

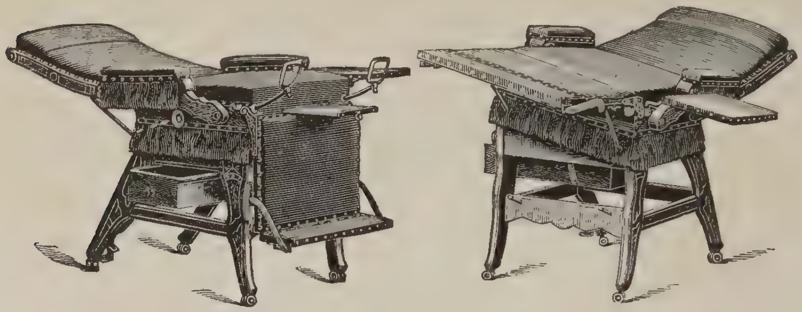
FIG. 2.



The Allison Gynecological Table, arranged for the Left Lateral Position.

At the office the physician should be provided with a gynecological table or a chair of simple construction that allows of elevating or depressing the shoulders or that can be made perfectly flat. Stirrups should be attached, so arranged that the feet can be elevated, depressed, or separated to any required extent, and held near the body or some distance away.

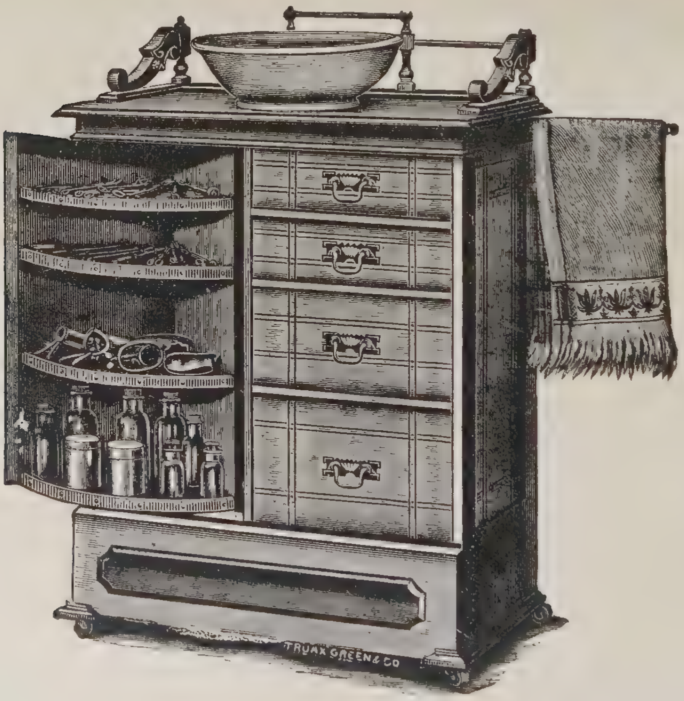
FIG. 3.



The Indianapolis Gynecological Chair, arranged for Dorsal and Lateral Positions.

The end of the chair or table should be toward and near a window. Between it and the window, and at the right hand of the operator as he sits facing the chair, should be placed a cabinet or stand with drawers for holding instruments, medicine, and appliances. A stationary washstand should be near. By thus having everything con-

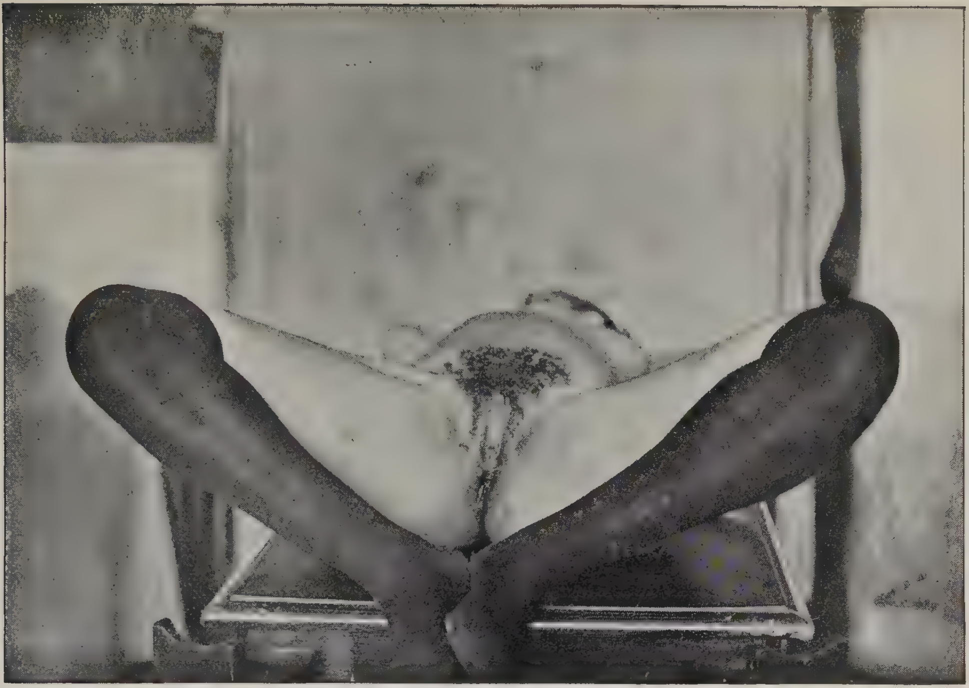
FIG. 4.



Gynecological Cabinet.

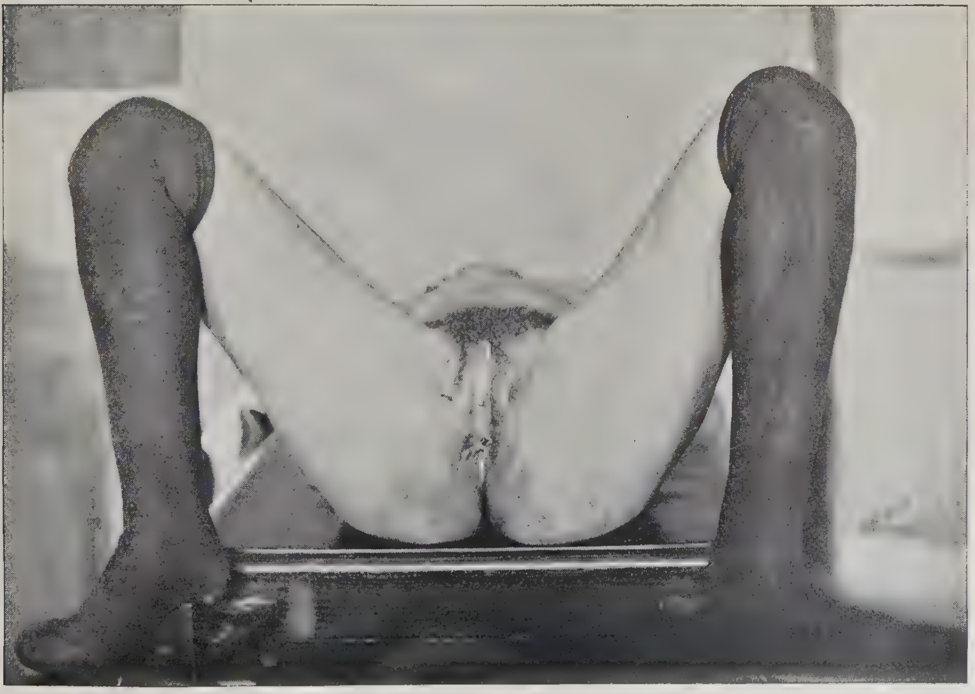
PLATE II.

FIG. 1.



Dorsal Position for Pelvic Examination : faulty.

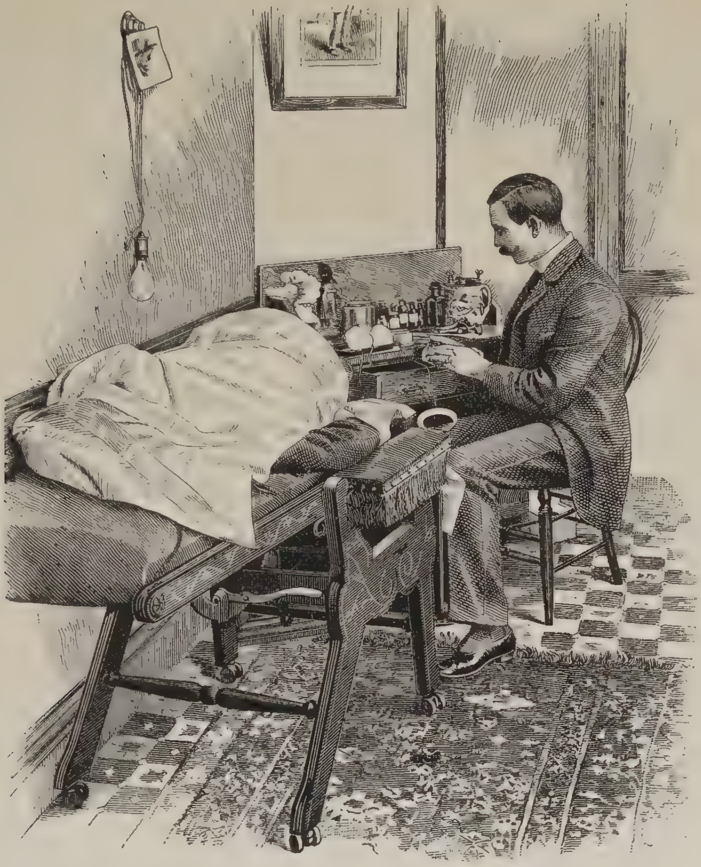
FIG. 2.



Dorsal Position for Pelvic Examination : faulty.

venient, one works easily and rapidly and saves time to himself and trouble to the patient.

Fig. 5.



Arrangement for Office Examination and Treatment.

A sheet should always be at hand to throw over the patient as she lies down.

Position of Patient.

For ordinary pelvic examinations the patient should be put on her back, with the hips at the edge of the chair or table, facing the window, and the feet supported in the stirrups on a level with her hips, far enough apart to allow ample space between them for the physician to work, and far enough from the patient's body for her comfort. Generally the head and shoulders should be slightly higher than the hips. In special instances we may elevate the shoulders and feet in order to secure greater abdominal relaxation. This is called the dorsal position. It is the best position for the digital and bimanual examinations, and is often employed for ordinary treatment on account of its convenience.

A digital examination may be made in the *Left Lateral* or *Sims' position.* The patient is placed upon her left side with the hips at the left-hand corner of the table, and both knees drawn up as far toward the chest as possible. The left arm should be drawn back behind her, and the right or upper knee drawn a little farther up and over the left until it almost touches the table, in order that the patient may be tipped on her left breast. Care must be taken to keep the knees well flexed. It is better to have the foot of the table a little higher than the head.

This position has the disadvantage that the upper pelvic organs are not as easily reached as in the dorsal, and that it must be changed to the dorsal position for the bimanual examination. For inspection of the vaginal fornices, tamponment of the vagina, and operations upon the cervix and anterior vaginal wall, it is in this country and England the favorite position.

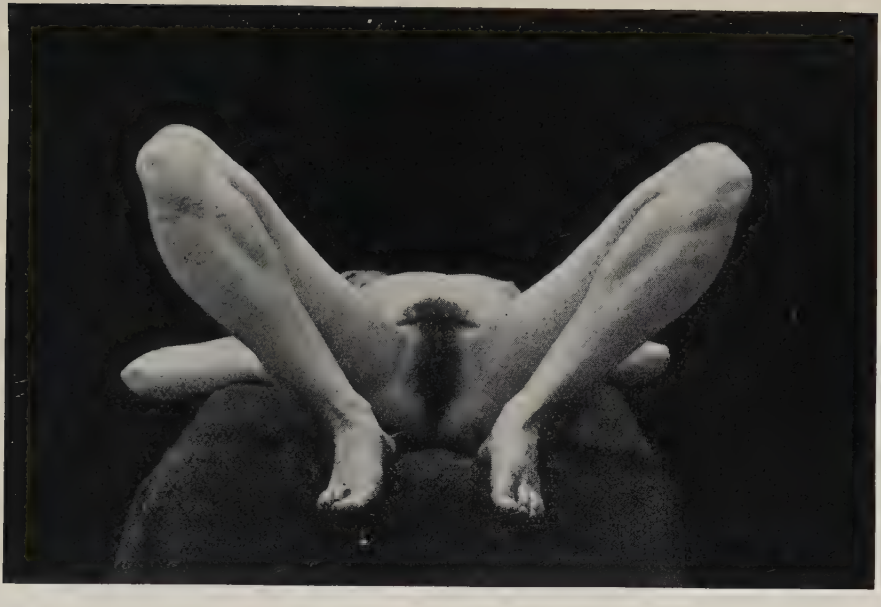
The *Knee-chest* position requires that the patient kneel near the edge of the table, and, with arms thrown back and head turned to one side, allow the chest to sink down on the table just in front of the knees. The thighs are flexed on the abdomen. The chest is lower than the pelvis, and when air is allowed to enter the vagina the uterus sinks away from the vaginal entrance. This peculiarity is shared by the lateral position. For altering the position of the pelvic organs and for vaginal tamponment this position is useful, but it is not desirable for ordinary examinations.

The *Trendelenburg* position is obtained by placing the patient on her back and raising the lower end of the table, thus elevating the pelvis and thighs and allowing the legs to fall over the edge. Its chief advantage is for operations upon the pelvic organs by abdominal section. The abdominal viscera recede from the pelvis, and leave the pelvic peritoneal cavity open to inspection through the abdominal incision. It is not often employed for examinations per vaginam. The accompanying cuts illustrate this position as obtained by the use of Florian Krug's frame, which can be fastened to any table.

The *Upright* position gives information as to the position of the pelvic organs while the patient is up and about her duties, and is chiefly useful in determining the extent of displacements. In this position the patient stands against some supporting object with the

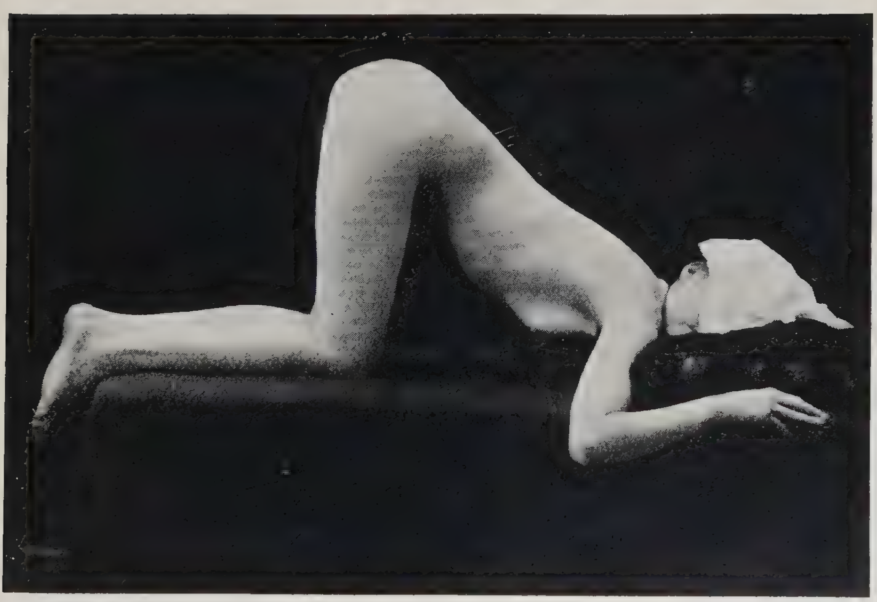
PLATE III.

Fig. 1.



Dorsal Position for Pelvic Examination: correct.

Fig. 2.



Knee-chest Position.

feet separated, while the physician kneels on one knee in front of her.

METHODS OF EXAMINATION.

There are three methods of examination: the ocular, the manual or digital, and the instrumental.

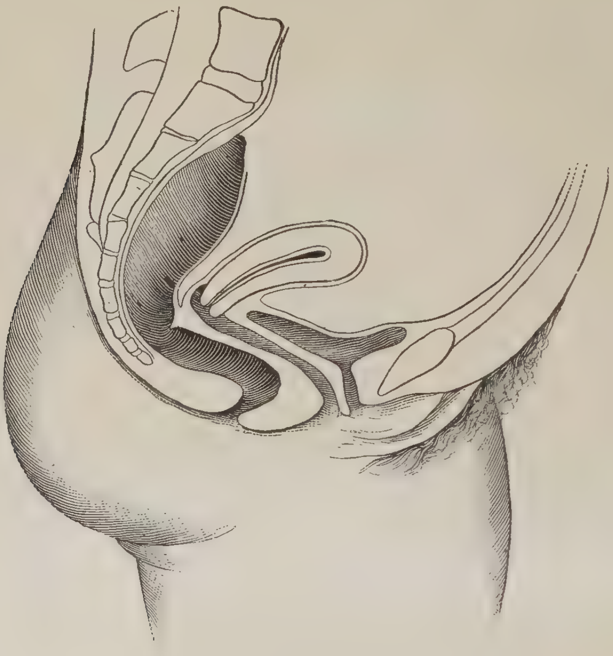
Ocular Examination.—If the symptoms point to a disease of the vulva or vagina, the patient is placed in the dorsal position, covered with a sheet, the skirts pushed up over and beyond the knees, and the sheet pushed back between the limbs over the mons Veneris, so as to expose the vulva and perineum. The external parts and vaginal entrance are then inspected, and the finger introduced as far into the vagina as necessary.

Digital Examination per Vaginam.—For this examination the best position is the dorsal. If the symptoms point to intrapelvic disease, it is best not to expose the patient at first, but pass the partly-closed hand under the sheet along the inside of the thigh until the dorsal surfaces of the fingers gently touch the perineum or vulva. The position of the labia majora will be immediately recognized and any abnormal condition detected. The dorsal surface of the index finger is gently pushed between them until arrested in the vaginal entrance. The finger is then extended, and the finger-end glides over the perineum into the vagina. Any peculiarity of the hymen, obstruction from a vaginal tumor or prolapsed organs, or gaping of the parts from relaxation or laceration will be forced upon the attention, either by the difficulty or the unusual ease of the manœuvre. When there is much deviation from the normal, the parts may be exposed to view at once, otherwise the ocular inspection and external manipulation are better left until the internal examination has been made.

After the finger has entered the vagina the posterior wall, or rectum which lies under it, will attract attention if abnormal. If not, the finger is turned, palmar surface upward, and slight pressure against the anterior vaginal wall is made to detect enlargement, displacement, or tenderness of the urethra and bladder or organs above them.

Having thus gone over the parts about the vaginal entrance, the objective point should always be the cervix uteri. It should be found from two and a half to three inches from the pubic arch, so that when the finger touches the cervix and is raised up against the anterior vaginal wall, the subpubic ligament will press against the finger between the second and third joints. The finger-end is swept around the cervix to see if the fornices are diseased or encroached upon by surrounding abnormal tissue. Very often one lateral fornix is narrower than the other, and by pressing straight outward laterally the distance of the pelvic wall will be found to be less on that side, and lateral displacement detected.

FIG. 6.



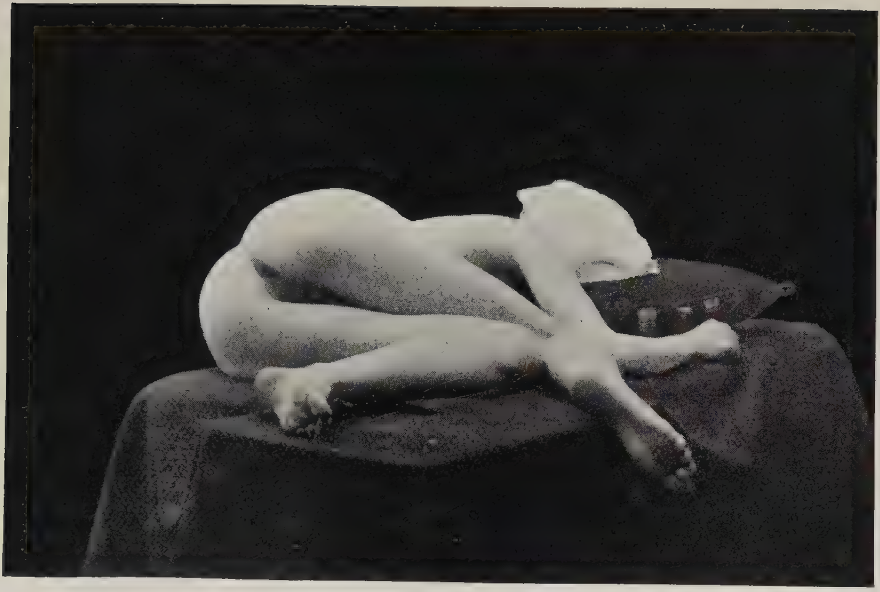
Normal Position of the Uterus.

The size, shape, and consistency of the cervix and the position and shape of the external os—in fact, all changes except in color—are discovered in this way, and the diagnosis usually made before the speculum is used. The finger-end should press well up in front, behind, and to the sides of the cervix, in search of an ante- or retroverted or flexed fundus, adherent ovary or pelvic exudate. By pressing well back and laterally we can sometimes catch an enlarged or prolapsed ovary against the pelvic walls. The right hand should be used for palpating the right side of the pelvis, and the left hand for the left side.

Vaginal palpation of the ureters is easily executed in the dorsal position, and should always be practised. They are much more easily felt than might be supposed, because they are situated at the

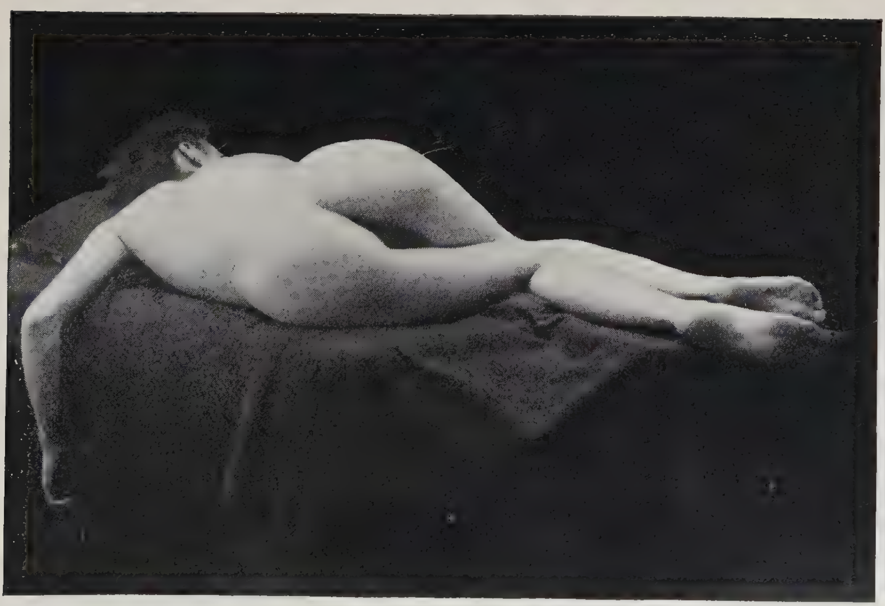
PLATE IV.

FIG. 1.



Left Lateral or Sims's Position: front view.

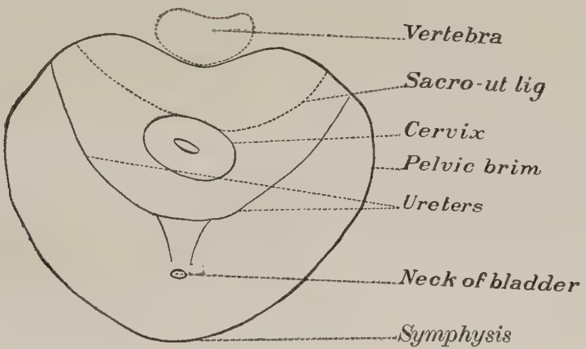
FIG. 2.



Left Lateral or Sims's Position: back view.

dividing-line between the soft, elastic parametric connective tissue and the firmer peripheral fatty connective tissue, at the lateral and front parts of the pelvis. The finger-end, pressed very gently upward in front of the cervix and drawn toward the pubes, feels, about half an inch in front of the cervix, the posterior edge or base of the trigone of the bladder, and then comes upon the firmer part of the anterior vaginal wall under the trigone. By repeating this forward and upward hooking motion of the finger-end, getting a little more to one side each time, the same cord-like edge of the firmer tissue representing the ureter can be traced laterally and backward toward the sacro-iliac synchondrosis. During the earlier months of pregnancy, and in the presence of disease of the ureters, they are easily traced as large, somewhat tense cords, backward and outward to the pelvic walls.

FIG. 7.



Direction of the Ureters.

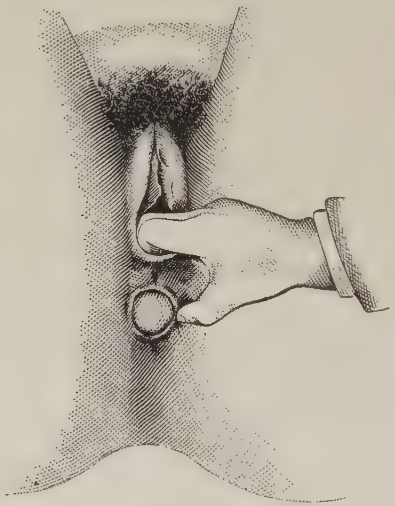
Two fingers may be used in the vaginal examination when it is desirable to reach further than possible with one. One finger is, however, generally to be preferred, because the touch is freer and more delicate and the inconvenience less to the patient.

By hooking two fingers backward toward the coccyx, and then strongly outward toward the anus, the anterior wall of the rectum may be everted, and its condition, as well as that of the anal rim, be revealed to the eye. The manœuvre is somewhat painful, and not always well tolerated by the patient. The finger and thumb of the other hand may with advantage push the tissues behind the anus backward, so as to increase the anal distension.

Digital Examination per Rectum.—In virgins with sensitive hymen or small vaginæ, or other patients in whom the posterior pelvic wall cannot be reached, or in whom conditions in the posterior half of the pelvis cannot be diagnosed through the vagina, rectal indagation gives valuable information.

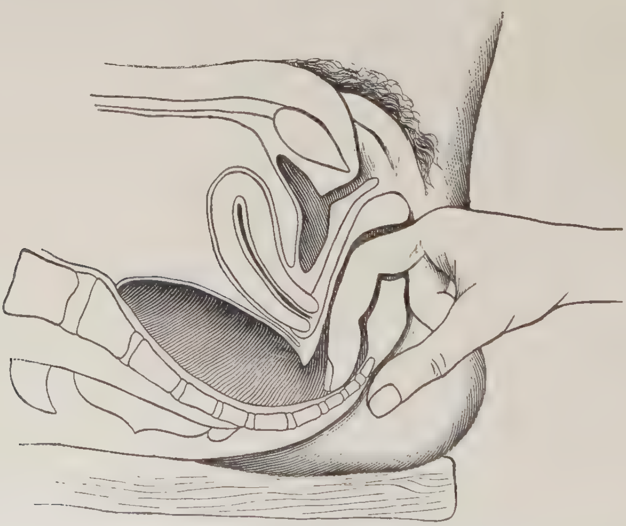
As the rectum is dry and sensitive, the forefinger should be abundantly smeared with vaseline or some other unirritating fat, and introduced, palmar surface down, in a forward direction until the finger-end has passed over the edge of the levator ani (rectal promontory), and then flexed a little until the whole finger is introduced. Then it should be straightened and slowly rotated until the palmar surface can be used to palpate the anterior wall. Before rotating it is well to touch the coccyx, or even grasp it between the finger within and the thumb without. Fracture, anky-

Fig. 8.



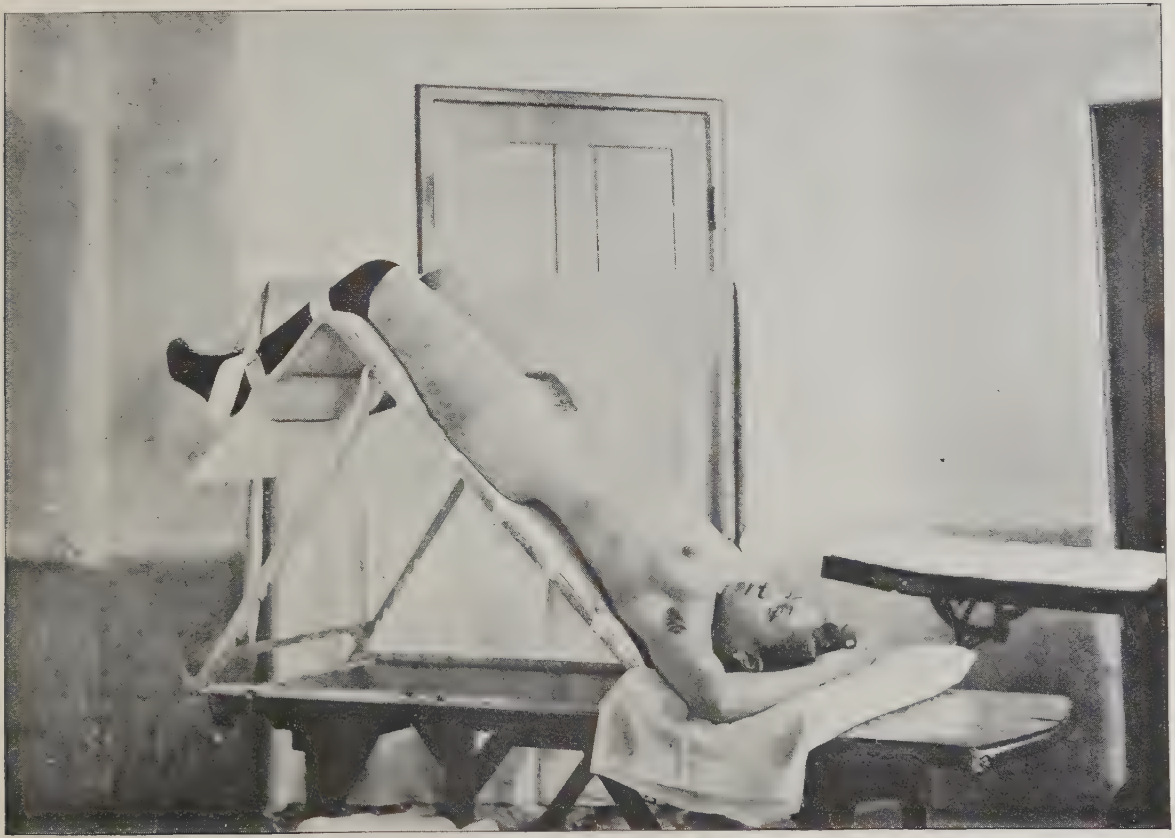
Digital Eversion of the Rectum.

Fig. 9.



Palpation of the Coccyx.

PLATE V.

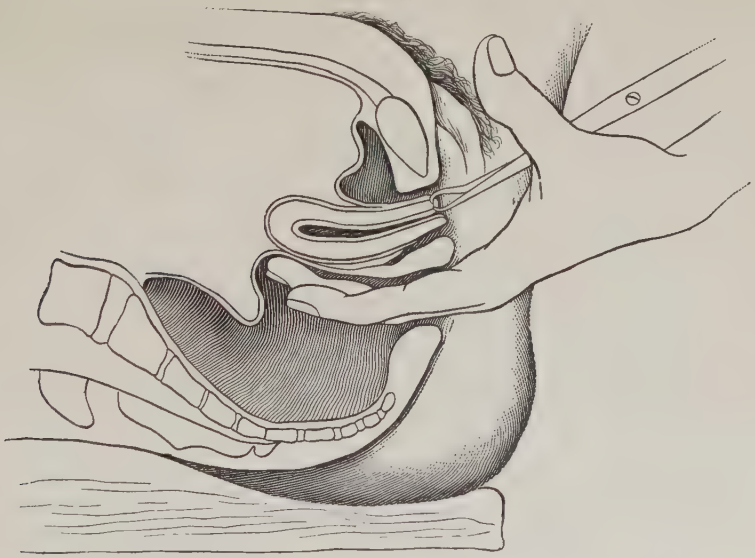


Patient in Trendelenberg's Position on Krug's Frame: side view.

losis, unusual mobility, abnormal sensitiveness, or dislocation can be detected.

As soon as, or even before, the finger is rotated, the cervix, or, if there be retroflexion, the fundus uteri, will usually be detected within easier reach than per vaginam. The finger is then pressed on under the retroflexed or retroverted fundus, and readily detects an ovary or tube in the cul-de-sac of Douglas or any induration at the uterine horns. The retroverted fundus can be pressed upward, and any unusual resistance or bands of adhesions recognized. Appendages or tumors adherent to the lateral and posterior walls of the pelvis are easily felt. The connective-tissue fibres running from the cervix to the pelvic walls usually shut off the upper part of the pelvis from observation. In order to reach these higher parts the finger-end is pushed along against the sacrum, until it passes through a constricted part of the gut and emerges up behind the uterus, and between and over the sacro-uterine ligaments. It then has access to the lower abdominal cavity and can palpate the parts with distinctness. Usually, however, the anus is too sensitive or the finger too short to allow of a satisfactory exploration of this kind, and two fingers with the aid of anesthesia will be required. The half or whole hand can be passed into the rectum and a complete intrapelvic exploration made. This, however, is apt to injure the sphincter ani and rectum, and is generally unnecessary, for the

FIG. 10.



Rectal Palpation of the Uterus drawn down by a Vulsellum Forceps.

bimanual examination with two fingers in the rectum gives us the same information without it.

An accurate knowledge of anatomy, and a little practice, will enable us to palpate and recognize the pyriformis muscle and the sacral plexus of nerves lying upon it, the small sacro-sciatic ligament, the greater sciatic foramen, the various pelvic arteries, etc.

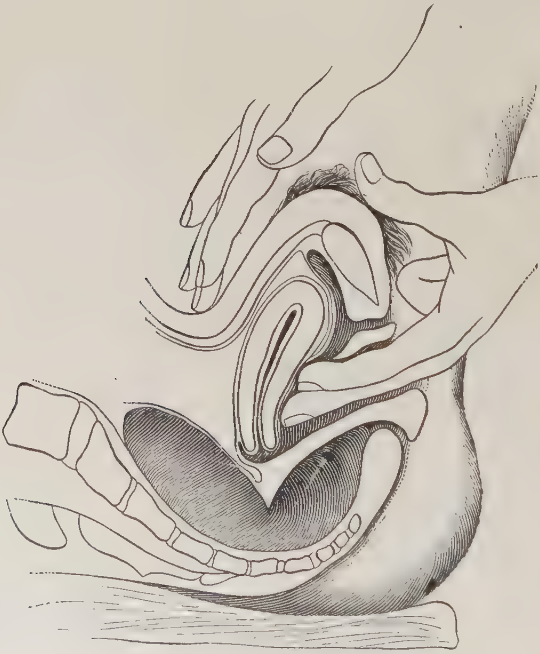
With the index finger in the rectum and the thumb in the vagina the cervix, or even the retroverted uterus, may be grasped and its size, mobility, and relations determined.

The fundus uteri and adjacent tissues may be rendered more accessible to the rectal finger by drawing the cervix to the vaginal entrance with a vulsellum forceps.

THE BIMANUAL EXAMINATION.

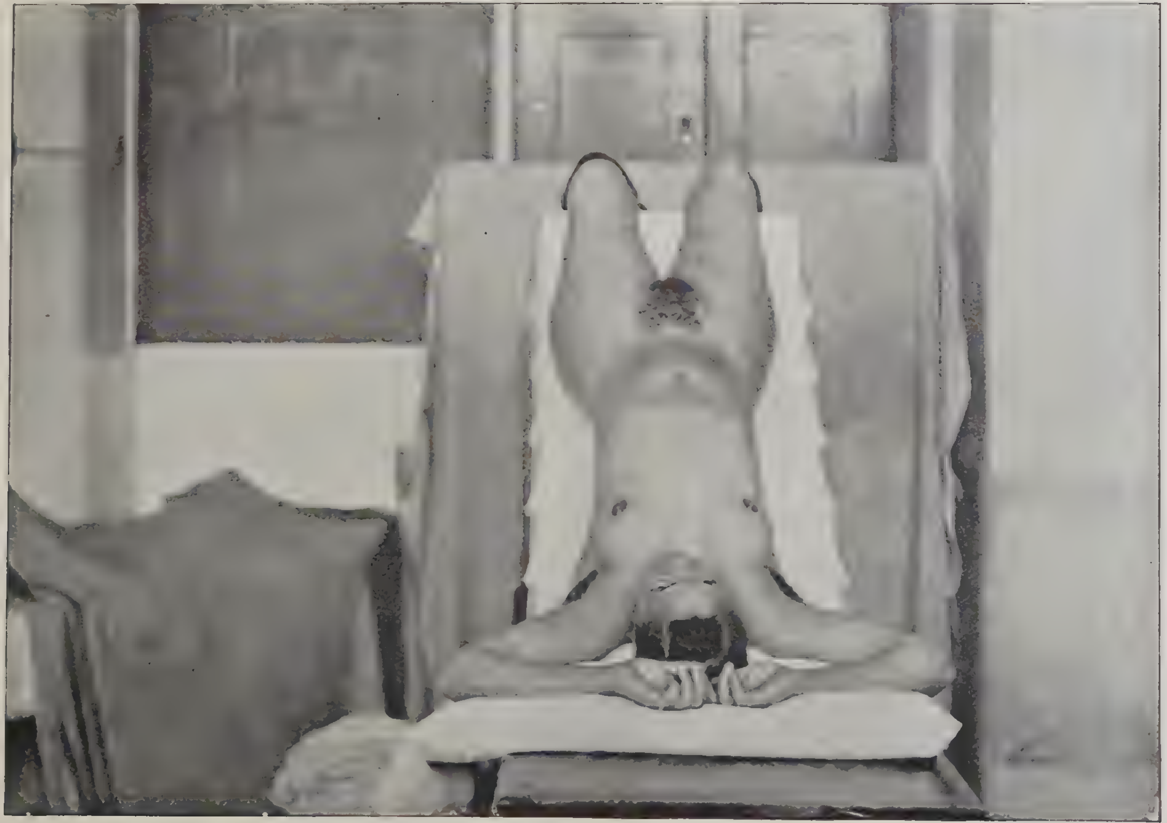
In order to complete our information with regard to the pelvic organs it is necessary to make use of the bimanual examination. To do this we first inform ourselves of the position of the cervix, etc., by ordinary vaginal indagation, after which the other hand, previously placed over the pubes, presses gently, but with increasing firmness, upon the abdominal walls, sinking the finger-tips a little

FIG. 11.



Bimanual Palpation of the Uterus.

PLATE VI.



Patient in Trendelenberg's Position on Krug's Frame : front view.

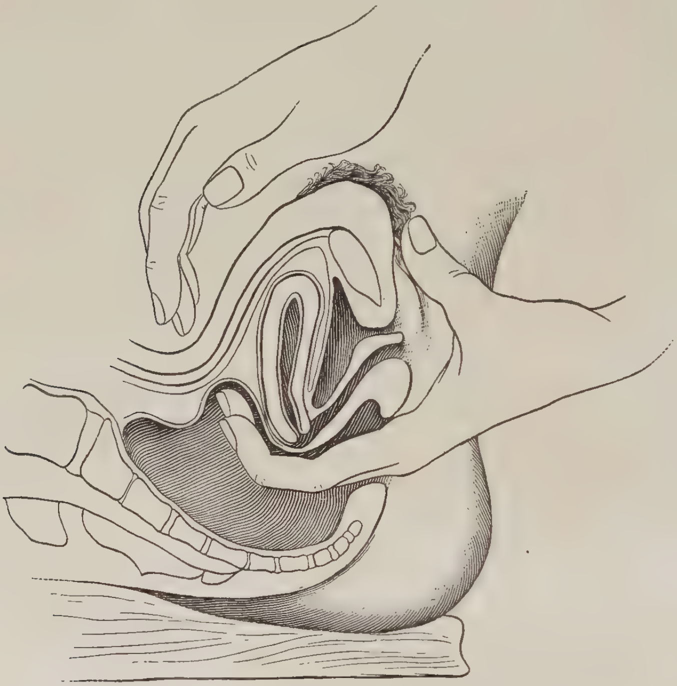
deeper with each inspiration of the patient, until the uterus is felt to descend upon the vaginal finger. Thus the uterus is brought down until its anterior and lateral surfaces can be easily palpated through the anterior vaginal wall. By a series of gentle pushes from above and below the position, mobility, size, and shape of the uterus can be ascertained. Great gentleness must be observed not to hurt the patient nor to displace the organ before its position is determined. In case the fundus is not felt, the outside finger should be pressed into the abdominal walls a little higher up. When the abdominal walls are lax or the patient anesthetized, they can be depressed until the sacral promontory is felt. Then the fingers are brought downward toward the pubes until they are felt by the vaginal finger to touch and move the uterus. Under an anesthetic the retroverted uterus can be picked up between the fingers bimanually and replaced, or if adherent its mobility tested.

The uterus can be retroverted by hooking the cervix forward by the vaginal finger, and sinking the external fingers over the pubes and pressing toward the sacral promontory, and thus the posterior surface brought within reach.

By pressing well down beside the uterus until the fingers of both hands touch with only the abdominal walls between, we may palpate the ovaries and tubes. If the ovaries are not easily recognized, the fingers of the two hands should be kept in contact and brought toward the pubes and Poupart's ligament, alongside the anteverted uterus, from the cervix toward the fundus. The first decided information is given by the sudden slipping of the ovarian ligament between the finger-ends, like a tense cord stretched across the field. By repeating this manœuvre a little further to the side, we come against the ovary, which if small may merely feel like a fusiform enlargement of this cord. The ureter may give a sensation similar to the ovarian ligament, but it feels less tense and is easily traced to the side of the pelvis by the vaginal finger, and thus differentiated. The round ligament feels like a relaxed cord, and is only felt indefinitely. The normal Fallopian tube gives only a very indefinite sensation, as of a fold of membrane. When enlarged and occluded it usually curves backward over the ovary, and feels somewhat like a small fusiform or club-shaped tumor tapering toward the horn of the uterus. Extensive adhesions usually cause a matting together of the appendages in a roundish or irregular-shaped mass, but little movable itself, and partially fixing the uterus.

With one or two fingers in the rectum the external (abdominal) and vaginal fingers may be approximated behind the uterus, and the condition of the posterior and upper parts of the pelvic cavity quite accurately ascertained.

FIG. 12.



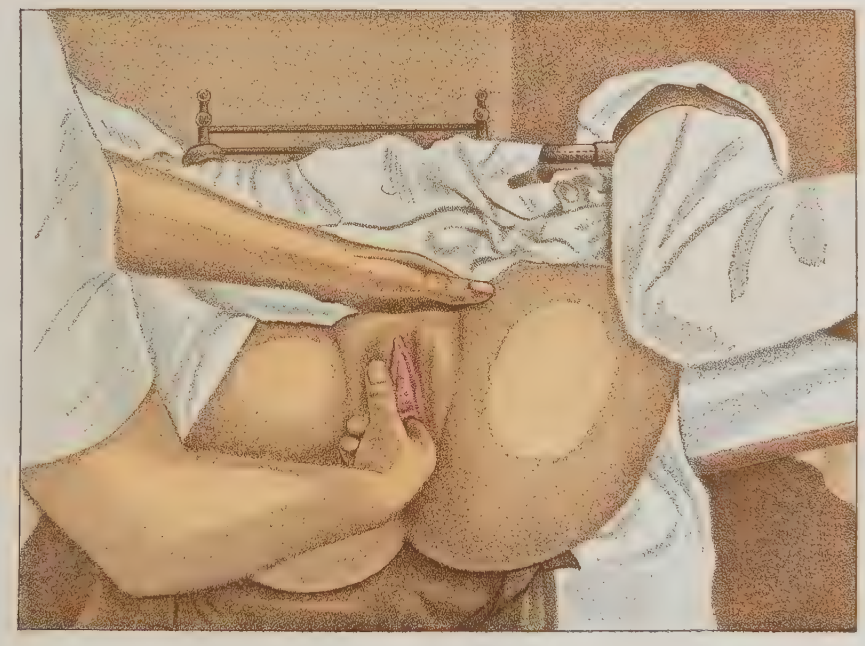
Bimanual Rectal Palpation of the Pelvis.

With a finger in the rectum and the thumb in the vagina grasping the cervix, while the fingers and thumb of the other hand grasp the fundus through the abdominal walls, the consistency, flexibility, size, mobility, and relations of the uterus can be appreciated with a surprising degree of ease. The displaced uterus can be grasped and replaced in this way.

In order to become an expert diagnostician the gynecologist should accustom himself to use either hand in the vagina or over the abdomen, that he may be able to reach both sides of the pelvis.

The bimanual examination of the uterus is of the utmost importance in the diagnosis of pelvic tumors. Ovarian tumors of moderate size are often entirely overlooked when they lie over and behind the uterus, because they are not within reach of the vaginal finger. When, however, the abdominal walls are pressed down into the pelvis, not only is the tumor discovered, but its size, consistency,

PLATE VII.

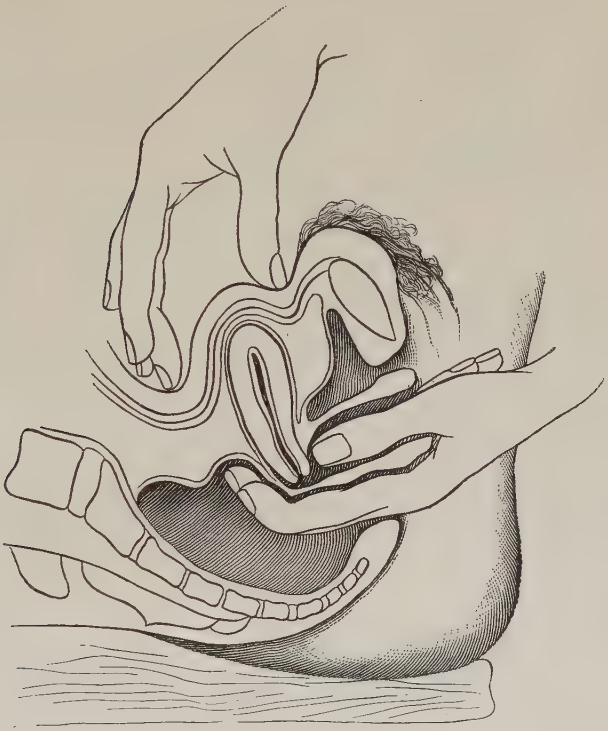


Bimanual Palpation of the Pelvis.

mobility, and the length of its pedicle are often recognizable. Tumors of the uterus can be mapped out in this way and their size and relations to the organ determined.

Digital and Bimanual Examination in the Lateral Position.—Similar examinations may be made in the left lateral position with the left hand in the vagina or rectum and the right hand over the abdomen, but hardly as satisfactorily as in the dorsal position. However, it gives one a better comprehension of the mobility and relationship of the organs to examine in both positions and compare results.

Fig. 13.



Bimanual Recto-vaginal Palpation of the Uterus.

Anesthesia.

In many cases, even after a thorough evacuation of the bowels, the tension of the abdominal walls, the sensitiveness of the organs, or the complications in the pathological conditions render a satisfactory examination impossible. In such cases the administration of an anesthetic not only renders all of the methods described available, but the relaxation of the tissues enables us to employ them without force and without fear of causing that feeling of soreness and discomfort that sometimes follows a thorough examination without the anesthesia. When there is the slightest doubt as to the pathological condition, the patient should always be anesthetized for the examination.

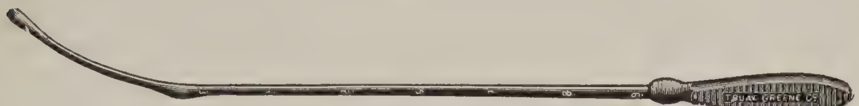
Examination of the Vaginal Entrance.

An ocular examination of the vaginal entrance will reveal the condition of the superficies, but will be incomplete unless aided by the educated touch. If a laceration is mostly external, its extent is much better appreciated if the finger be introduced into the anus and the thickness of the perineal body palpated between the finger and thumb. The scar-tissue may be blanched and made plainly visible by pulling out the tissues with the finger in the anus, so as to stretch the perineal body. If the fourchette be intact, the extent of internal deficiency due to laceration may be measured by pressing the finger down along the pubic rami within the vulvovaginal entrance. Normally, the levator vaginæ stretches around the vaginal entrance, so as to prevent palpation of the pubic ramus except by quite firm pressure. When the fibres of this muscle are torn, the anterior sulci beside the urethra are widened and the bony surfaces easily felt. The vaginal entrance, instead of being ovoid or roundish, is bounded posteriorly by the V-shaped edge of the levator ani, with the rectum passing over it filling the angle and leaving a sulcus on either side. When the transversus perinei is torn, the finger readily traces the bony surfaces of the pubic rami down to a level with the anus on the side of the tear. When the sphincter is torn, the anterior edge of the anus is thin and cicatricial, and the dark-red edges of the rectal mucous membrane are visible, often giving an ulcerated appearance to the novice.

Instrumental Examination.

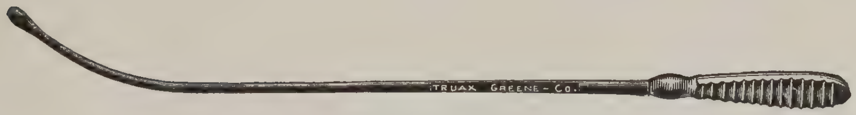
The Uterine Sound.—Various forms of uterine sounds have been devised. The most serviceable ones are Simpson's and Sims'. They are about 30 cm. long, and from 2 to 3 mm. in diameter, with a slightly enlarged bulbous end. The end toward the handle is somewhat thicker. Simpson's sound, formerly stiff, is now made of a somewhat flexible metal, and has a mark indicating the normal length of the uterine cavity (2½ inches, or 7 cm.); Sims' sound is a trifle lighter and much more flexible than Simpson's. They should be made entirely of metal. Jenks' spiral sound and Thomas's whalebone or hard-rubber probe are useful forms, because they adapt themselves to the curve of the uterine canal. On account of their elasticity they do not retain its curve. Uterine probes resemble the sound in shape, but are more delicate, and are useful in exploring a distorted uterine cavity.

Fig. 14.



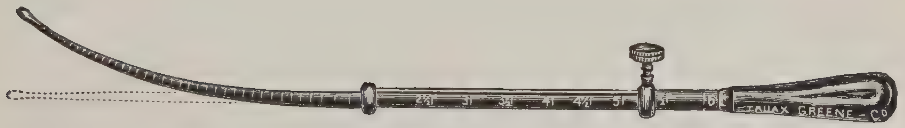
Simpson's Uterine Sound.

Fig. 15.



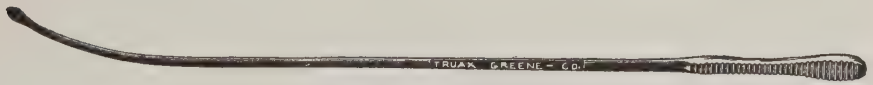
Sims' Uterine Sound.

Fig. 16.



Jenks' Uterine Sound.

Fig. 17.

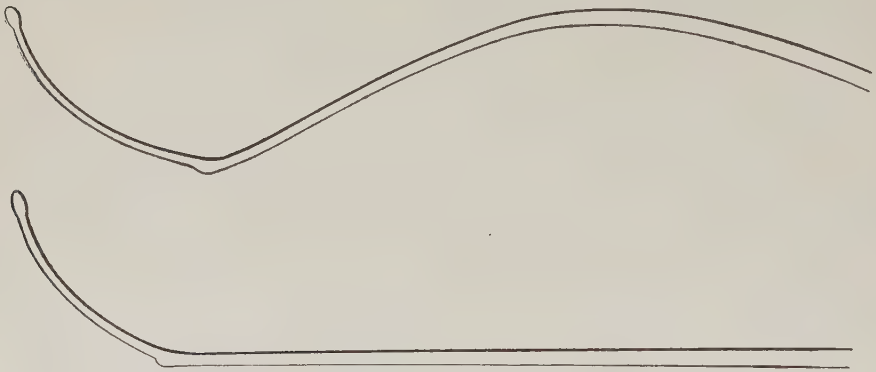


Thomas's Hard-rubber Probe.

To Introduce the Sound, the cervix should be located with the index finger, and the sound, bent about seven centimetres from its point at an angle of about forty-five degrees, introduced along the palmar surface until the bulbous end passes into the cervical canal. By depressing the handle and, if necessary, drawing the cervix slightly forward either with the finger, the sound, or a tenaculum, the instrument easily passes to the fundus. No force must be used, but the curve of the sound changed again and again, if necessary, until it passes easily. By giving it a sharper curve with a counter-curve near the handle we often succeed better in making it pass a more acute flexure.

The digital or bimanual examination will often enable us to determine what the angle or curvature of the sound must be. A narrowness of the internal os, due to uterine flexion or spasmodic contraction, sometimes interferes with the passage of the sound and may render it painful. In such cases much force should not be used, but the attempt postponed until an examination by the speculum is made.

FIG. 18.



Curves of the Uterine Sound to Facilitate Introduction.

The Uses of the sound consist in ascertaining the patency of the uterine canal, its direction, length, size, and sensitiveness. In connection with the abdominal palpation we can also determine in what part of the uterus the enlargement or tumor is located. The mobility of the uterus and its connection with the pelvic organs, or its independence of them, can thus be more accurately determined than by the ordinary bimanual examination alone.

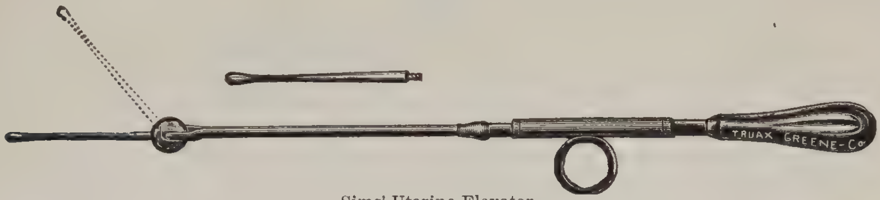
The Dangers in the use of the sound are the introduction of septic matter into the uterus, the lighting up of an old endometritis or pelvic inflammation, and the perforation of the uterine walls.

It is better, when practicable, to use the sound through the speculum after the vaginal fornices and cervix have been wiped out dry with absorbent cotton, and then swabbed out with a 5 per cent. solution of carbolic acid. When, however, it is necessary to use the sound without the speculum, the vagina should be thoroughly douched out with a 1 : 2000 solution of bichloride of mercury. The sound should be kept scrupulously clean, and be dipped in a 5 per cent. carbolic solution the last thing before its introduction. The spiral sound should be boiled after use in every septic case, and only used when the other sound does not give the information sought.

The softened uterine body has been perforated many times by the sound without serious results. In such cases the instrument passes almost its entire length, and can be felt bimanually through the abdominal walls. The only danger consists in carrying sepsis into the peritoneal cavity—not a very serious one if the proper antiseptic precautions have been taken.

It has occasionally happened that the sound has passed into a Fallopian tube. This is especially liable to occur in a uterus bicornis, and does no harm unless force is used or sepsis introduced. It is best never to use a sound where it is possible to gain the desired information by other means. In all but exceptional cases this may be easily accomplished, and consequently the use of the sound has in great part been dispensed with.

Fig. 19.

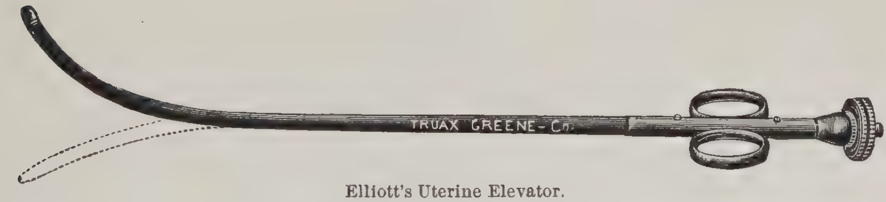


Sims' Uterine Elevator.

The Uterine Elevator.

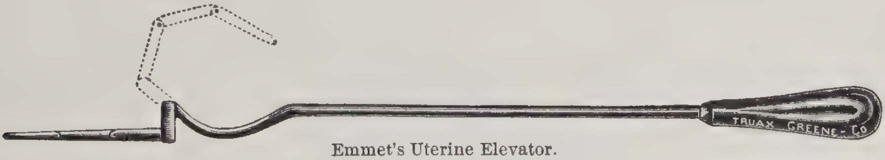
Another important, although at the present day infrequent, use of the sound is as a uterine elevator to replace the retroverted uterus. It has been variously modified, so that the angle can be changed by a screw or appliance on the external end. Such modifications are, however, objectionable, in that it is impossible to determine just how much force is being used, and whether or not the endometrium and uterine walls are being injured. By giving the uter-

Fig. 20.



Elliott's Uterine Elevator.

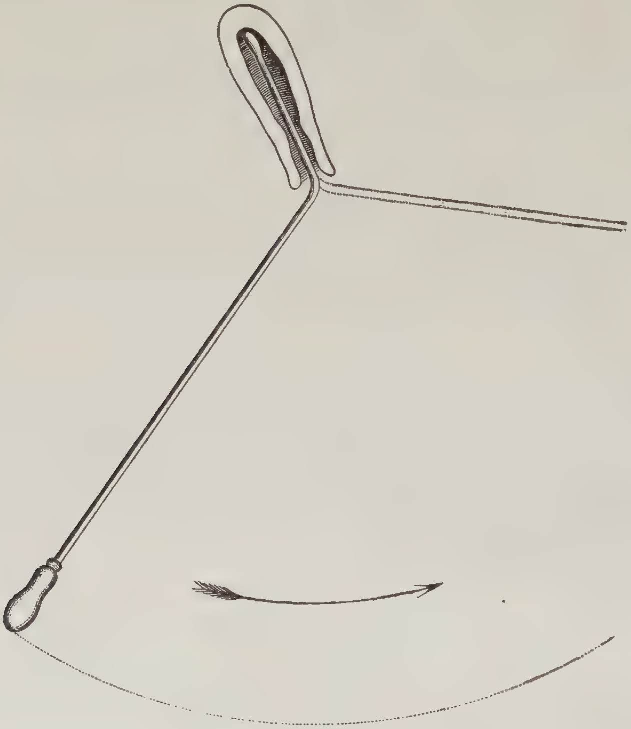
Fig. 21.



Emmet's Uterine Elevator.

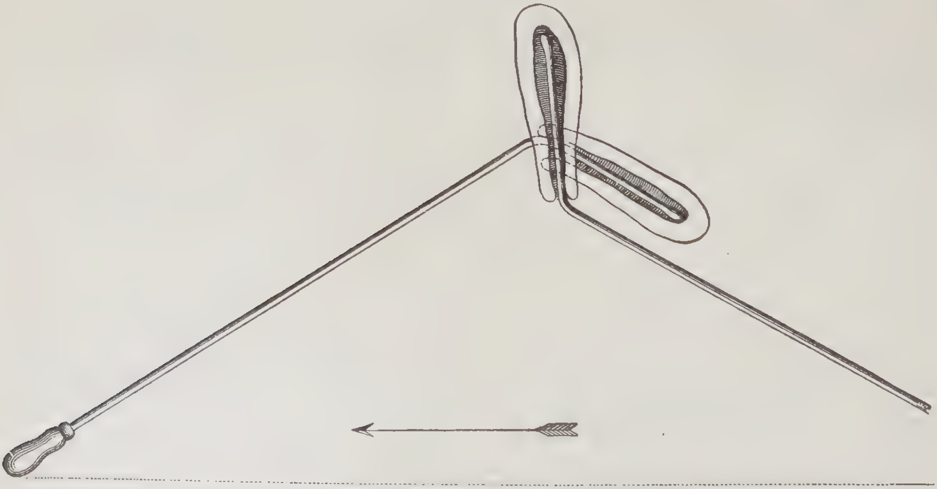
ine sound a proper curve and sweeping the outer end around a circle, the fundus can be elevated and the amount of resistance used easily gauged, and the use of much force avoided.

FIG. 22.



Replacement of the Uterus with the Sound. Upward curve of the handle without altering the position of the uterus. First motion.

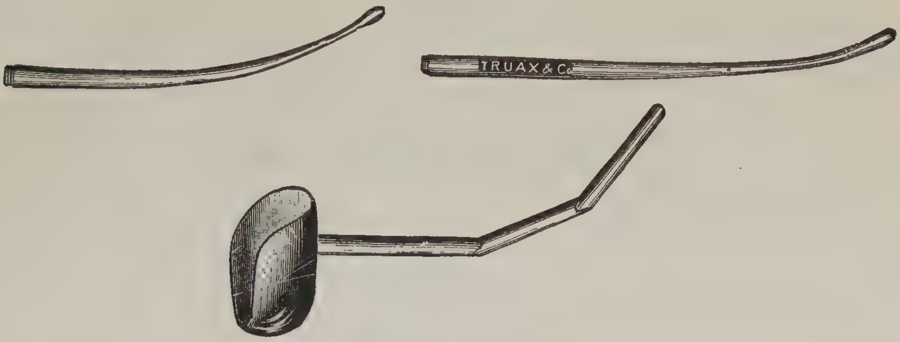
FIG. 23.



Replacement of the Uterus with the Sound. Depression of the handle so as to tip the fundus upward and forward. Second motion.

Byford's elevator, made by cutting off the sound at its point of emergence from the uterus and placing a finger-cap upon it at right angles, gives the requisite accuracy and delicacy of touch. It is introduced and the cap pushed in the direction opposite to that the fundus is to take. When the fundus rises high in the pelvis the finger readily slips into the cap and is held there by atmospheric pressure. The long axis of the sound and long axis of the finger are at right angles to each other, and thus the position of the fundus always known.

Fig. 24.

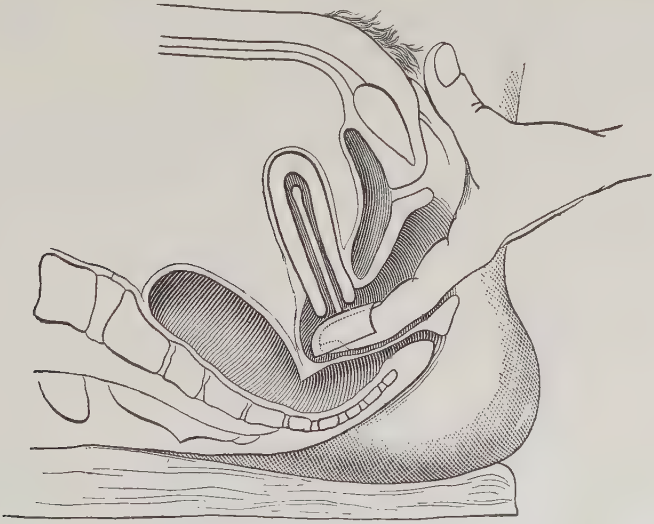


Byford's Uterine Elevator.

The Speculum Examination.

The methods already described will usually suffice for ordinary

Fig. 25.

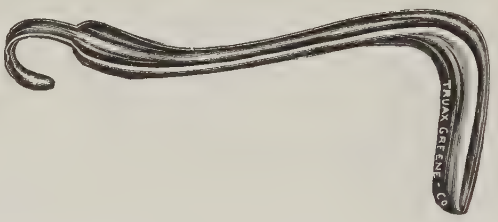


Action of Byford's Uterine Elevator.

diagnosis, but when an ocular inspection, local treatment, or plastic operation becomes necessary, a speculum must be used.

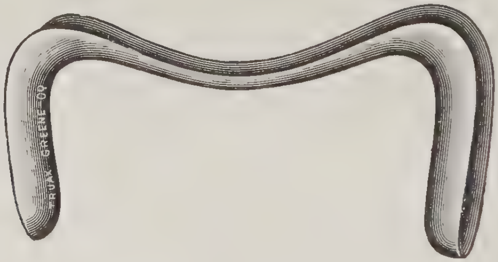
The simplest and most nearly allied to a perfect exposure of the parts is obtained by the use of a perineal retractor, in the lateral or Sims' position. When the patient is sufficiently turned on the breast and the perineum drawn back, the uterus and anterior vaginal wall sink away from the outlet and leave all the interior of the vagina exposed to view except the part covered by the instrument. If the patient be tightly laced or not sufficiently turned on the chest, the anterior vaginal wall will not be drawn far enough up behind the pubes. We may then have to use a depressor to push it out of the way. If we wish to get a closer view of the cervix, we can draw it nearer to the pubes by means of a tenaculum. This is also useful in steadying the cervix for the introduction of the sound. The uterine dressing forceps, of which a great variety have been devised, are invaluable in enabling us to wipe out the cervical mucus and disinfecting the vaginal fornices before using the sound. When

Fig. 26.



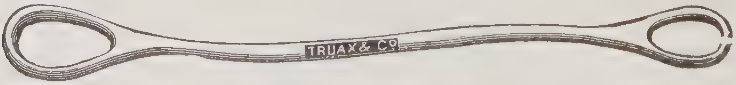
Sims' Retractor.

Fig. 27.



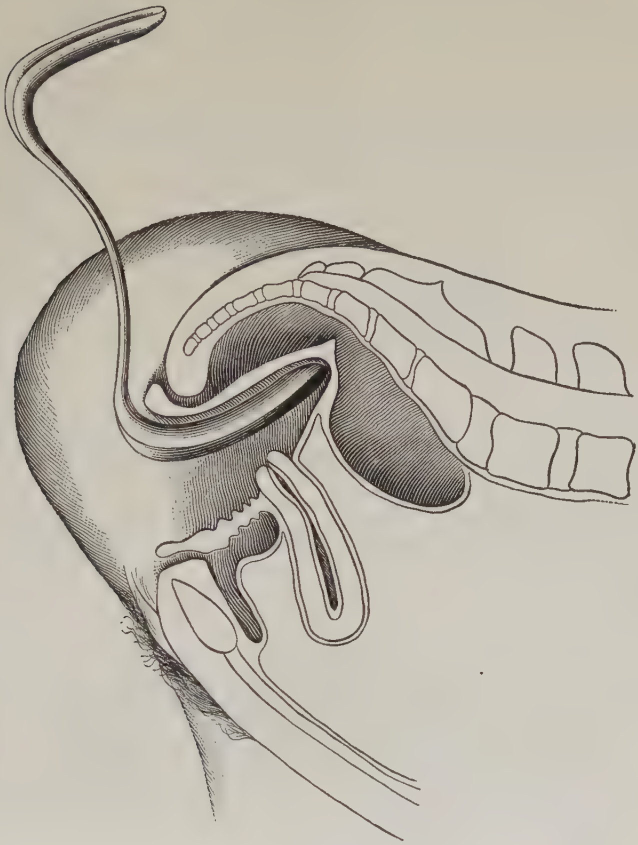
Sims' Speculum.

Fig. 28.



Sims' Double End Depressor.

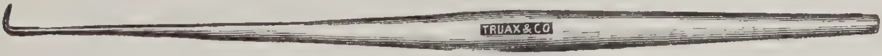
Fig. 29.



Sims' Speculum Introduced.

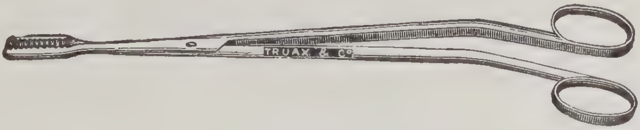
the mucus is too thick and tenacious to be wiped off, we can coagulate it by repeated applications of astringents or soften it with strong alkaline solutions. For making uterine applications, uterine applicators and intra-uterine syringes have been devised. The applicators usually consist of a flattened piece of flexible metal, preferably silver, or a silver probe flattened on the end and without any bulb-

Fig. 30.



Tenaculum.

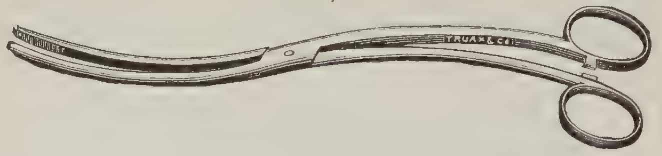
Fig. 31.



Byford's Uterine Dressing Forceps.

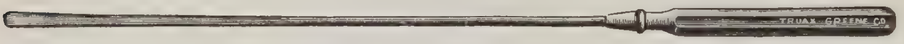
ous or other enlargement. A small flat piece of common cotton is wound tightly around it, dipped into the solution, and passed into the uterine cavity as far as desirable. Common cotton is preferable, as the medicines to be applied do not soak through it quickly, so as to corrode the instrument before it can be removed. The syringe is made of hard rubber, and is used by being introduced to the fundus of the uterus and the contents injected into the uterine cavity.

Fig. 32.



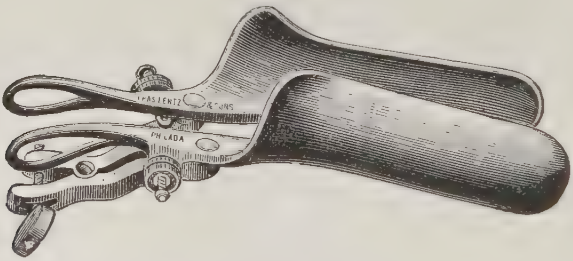
Bozeman's Uterine Dressing Forceps.

Fig. 33.



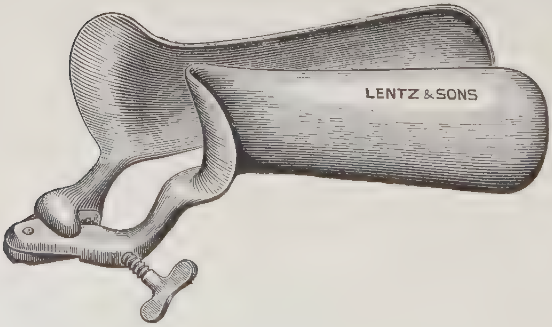
Emmet's Uterine (Silver) Applicator.

Fig. 34.



Goodell's Speculum.

Fig. 35.

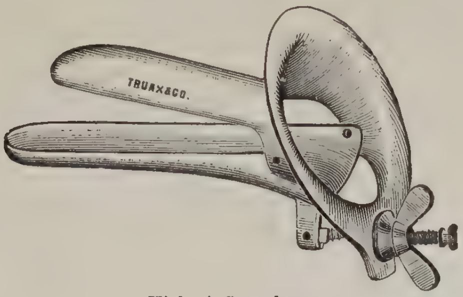


Talley's Speculum.

Vaginal tampons are easily introduced and adjusted in the Sims' position, for the vagina is expanded and the uterus is well up in the pelvis.

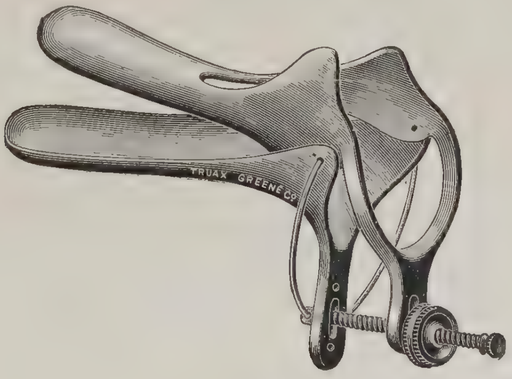
The Introduction of the Perineal Retractor requires some explanation. The double retractor, or Sims' speculum, is the one ordinarily used. After throwing a sheet over the patient the clothes are pushed up, the edge of the sheet tucked under the right or upper thigh, and the lower one, unless covered by the patient's drawers, is covered by a napkin. The speculum is grasped in the right hand with the index finger along the concavity of the blade, and pushed into the vagina with the convexity and handle toward the sacrum, while the labia are held apart with the fingers of the left hand.

Fig. 36.



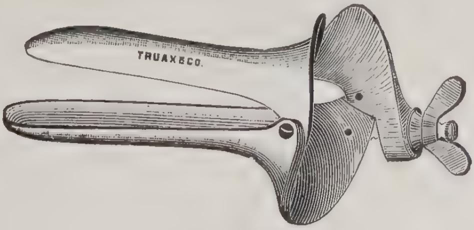
Higbee's Speculum.

Fig. 37.



Brewer's Speculum.

Fig. 38.



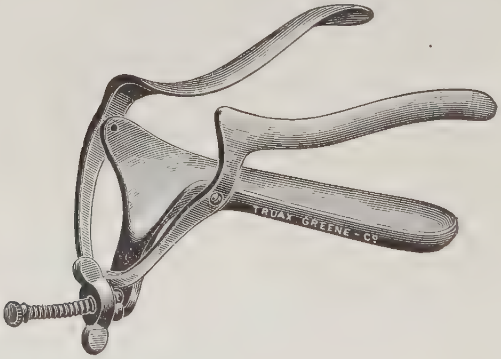
Taylor's Speculum.

The end of the blade is passed well back toward the hollow of the sacrum, and the perineum drawn away from the urethra so as to open up the vagina. An assistant then grasps the shaft of the retractor in his right hand, the thumb resting against the under surface of the outer blade, and with the left hand holds the nates up to the edge of the speculum. The left forearm of the assistant should rest upon the patient's hip, while the right elbow and forearm rest against his own body. This ensures against unsteady traction and early tiring on the part of the assistant.

The objection to the use of Sims' speculum in ordinary office practice is the necessity of having an assistant. Many ingenious modifications and appliances have been devised to retain the retractor, but as these require the use of a belt or shoulder-strap, their application is time-consuming and troublesome.

On account of these objections the Sims' speculum has not been able to displace the self-retaining bladed specula that are used in the dorsal position. For inspection of the cervix and the ordinary local treatment at the office the bivalve and trivalve instruments answer quite well. Through them the mucus can be wiped out, the fornices disinfected, the sound passed, the cervix dilated, intra-uterine applications made, and tampons placed.

Fig. 39.



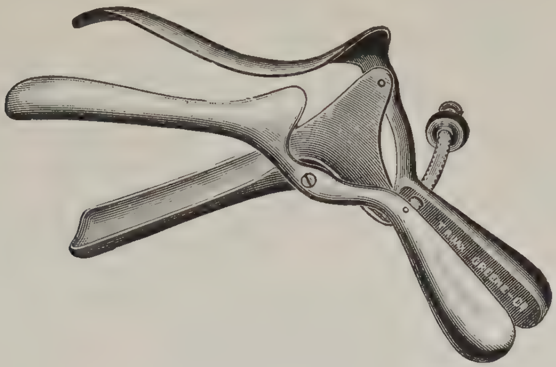
Nott's Trivalve Speculum.

Two or three sizes or varieties are requisite to enable one to fit all cases. Among the best are Talley's, Higbee's (three sizes), Goodell's, Brewer's, and Taylor's bivalve specula. Nott's and Nelson's are good trivalve instruments.

The cylindrical speculum, formerly so popular, is now seldom used in this country, as the exposure is too limited and the space within it too cramped. Fergusson's is the one usually found in the stores.

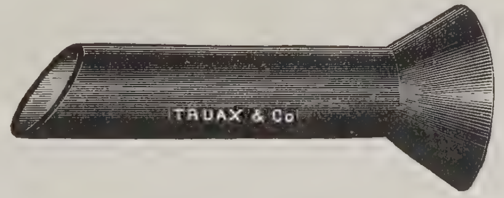
The right index finger first ascertains the position of the cervix, and is then held just within the vaginal entrance, while the thumb holds the right labium aside. The speculum is passed between the thumb and finger, with its upper blade laid diagonally on the right finger, until it passes into the vagina. As the speculum touches the vulva, the left middle finger should push the right labium well outward to prevent hairs or folds of the labia being dragged into the vagina. If such has happened, a very slight separation of the blades of the speculum releases the parts. The instrument is then turned so that the lower longer blade lies flat against the perineum and is passed on under the cervix. As the blades are separated, the upper one comes up just in front of the cervix and exposes it. With proper manipulation neither the sound nor ténaculum is ordinarily needed to bring the cervix within the field. When the cervix is well back and the vagina narrow, a long speculum, such as Taylor's, should be used; when the vagina is capacious, a large, short one, well expanded, serves better; such as Talley's, a large Higbee, or Brewer's. A medium-sized Higbee

FIG. 40.



Nelson's Trivalve Speculum.

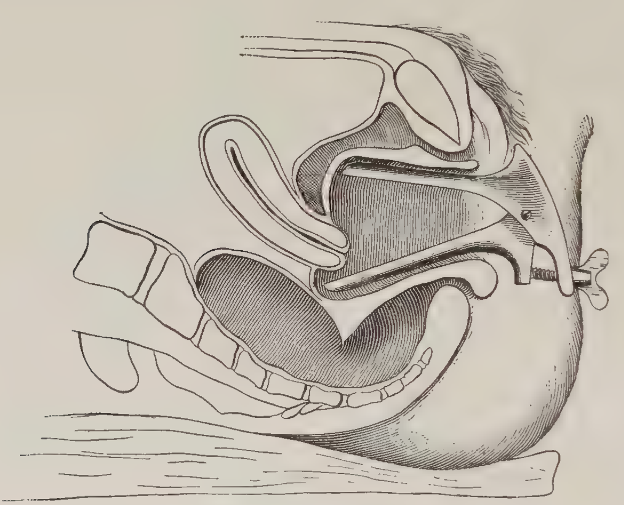
FIG. 41.



Fergusson's Speculum.

answers for the majority of cases. In virgins a small Higbee seldom fails to give satisfaction. The bivalve speculum should not be tightly closed when removed, for fear of pinching the labia or catching the hairs. For diseased conditions of the vaginal fornices a Nelson or Nott speculum often answers better, although not so well as the Sims' in the lateral position.

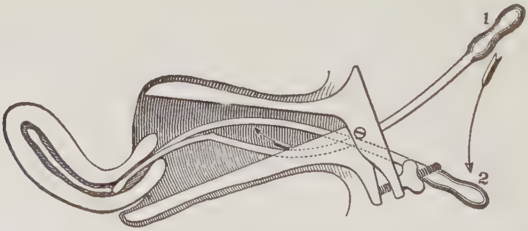
Fig. 42.



Higbee's Speculum Introduced.

The sound can ordinarily be passed into the uterus through the speculum without trouble, although in cases of anteflexion with a small cervix and vagina, the cervix will sometimes have to be hooked forward with a tenaculum. The greatest difficulty to the beginner consists in passing the sound in a case of anteflexion with retroversion.

Fig. 43.

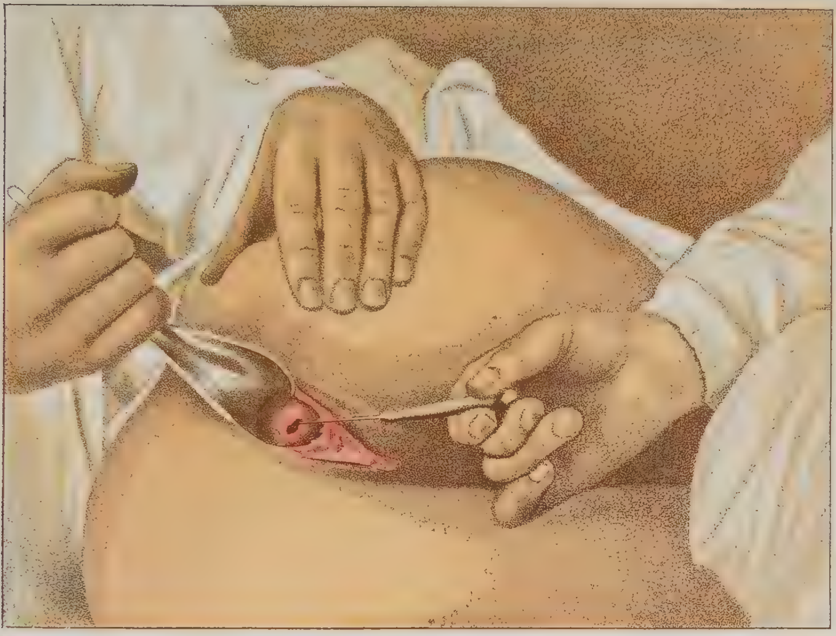


Passage of the Uterine Sound, in Case of Retroversion and Anteflexion.

This is, however, easily done by pressing the well-curved sound first toward the hollow of the sacrum, until arrested at the bend of the uterus, and then causing the handle to describe a semicircle,

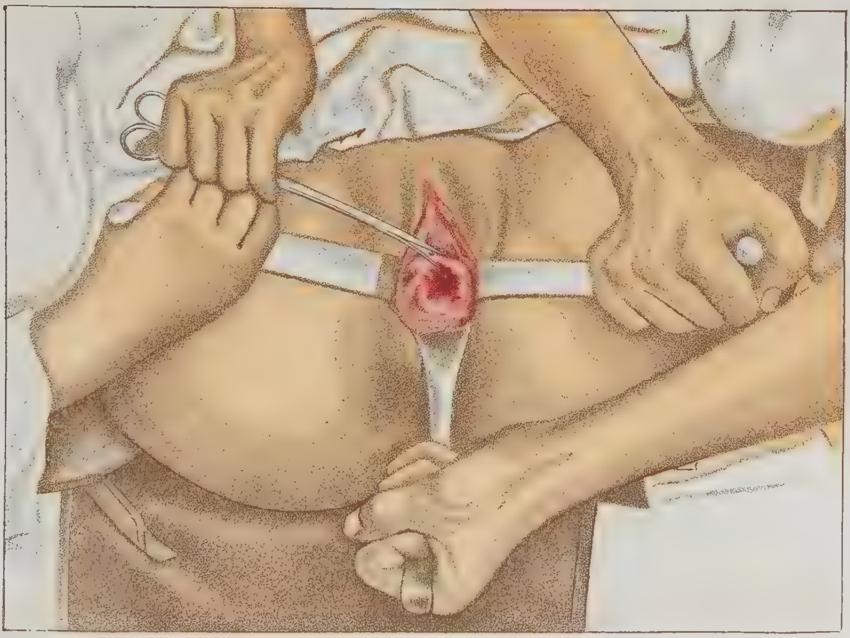
PLATE VIII.

FIG. 1.



Exposure of the Cervix through Sims's Speculum.

FIG. 2.



Simon's Position showing use of Retractors.

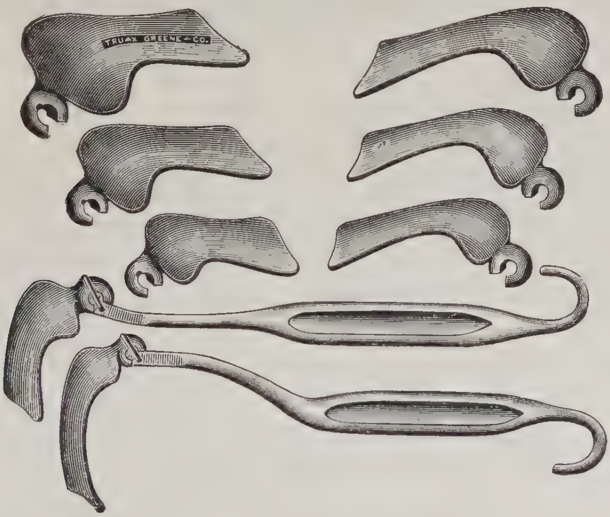
when the probe end will point upward; it will then readily pass to the fundus. It often seems to the beginner as if the sound had passed through a spiral or corkscrew canal. The same manœuvres, reversed, may be employed for sounding a sharply-retroflexed uterus.

In introducing tampons the cervix should be pushed in the direction it is to be held, and the tampons placed against or around it and held there by the forceps, until the speculum is partly withdrawn. When more tampons are needed they may be introduced and held until the speculum is withdrawn over them also. In ordinary treatment it is best not to use too many large tampons, since they over-distend the vagina and weaken its walls.

Examination in the dorsal position with vaginal retractors (Simon's method) is one of the most satisfactory methods, but usually requires the use of an anesthetic to display its advantages.

A broad perineal retractor holds back the perineum, and narrow ones keep the bladder or lateral vaginal walls out of the way. The cervix can usually be drawn down to the vulva by tenaculum forceps. Simon's retractors are seldom used in this country on account of their cumbersomeness. Lighter modifications are more often employed.

Fig. 44.


TRUAX GREENE & CO.

Simon's Retractors; Removable Aseptic Handles and Joints.

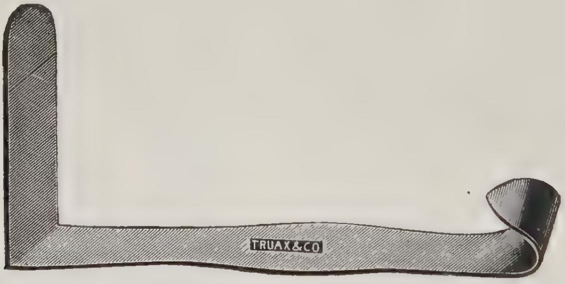
The speculum and perineal retractor are not, strictly speaking, instruments of diagnosis, for they reveal nothing that the finger cannot diagnose, except the color of the cervix and the character of the secretions issuing from its canal. Sims' speculum is best adapted for local treatment and for minor operations; the bladed speculum for local treatment; the Simon retractors for minor and major operations.

FIG. 45.

Jackson's Perineal Retractor.

Dilatation of the Genital Tract for Examination.—It often happens that a satisfactory examination is impossible on account of the narrowness of some portion of the genital tract. In virgins the hymen may not admit the fingers without great pain, and it may be necessary to make the first examination under anesthesia. In some cases we can succeed without an anesthetic by dilating the parts slightly and progressively at the first few sittings. We can sometimes introduce only the little finger (well lubricated) the first time. In two or three days the index finger may gain entrance, and the next time the smallest Higbee speculum. When we succeed in getting in the speculum, it should be allowed to remain a few moments, then slightly expanded, and a small glycerin tampon pushed through it into the vagina and left for twenty-four hours. The next time a larger tampon should be left. After this the cervix may be exposed, and all difficulty will soon disappear. Similar manœuvres may be made with the smallest-sized Sims' speculum. A virgin should, however, but rarely be examined. Should it become necessary, a rectal examination will usually answer all purposes;

FIG. 46.

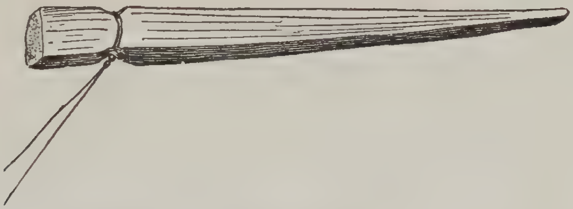


Byford's Lateral Vaginal Retractor.

but if this is found not to be satisfactory, the patient should be first anesthetized.

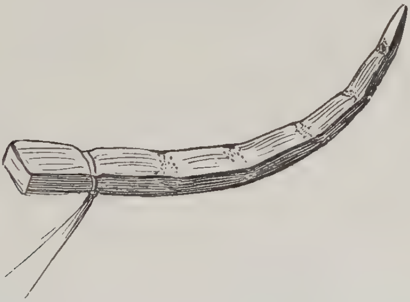
Very often a conical, flexed, or imperfectly developed cervix will prevent examination and treatment of the uterine cavity. In such cases the cervix should be drawn forward by a strong hook or vulsellum forceps, and some form of a tent or a dilator of small size gently forced into its canal. In some cases nothing can be made to enter without causing too much pain, except a slippery-elm tent but little larger than a crocheting needle, whittled out of a fresh piece of slippery-elm bark, moistened in a 5 per cent. aqueous carbolic-acid solution, and slightly crushed in the jaws of the dressing forceps to render it flexible. After two or three such treatments larger ones can be passed, and finally a small Hank's dilator or a delicate block-tin sound bent at a proper angle. We will then be able to explore the cavity with a small dull curette for softened mucous membrane, débris of malignant growths, etc. Schultze has recommended the introduction of a piece of sterilized lint or gauze into the vagina, and its removal in a few hours for the purpose of examining the secretions adherent to it.

Fig. 47.



Elm Tent, whittled from fresh slippery-elm bark.

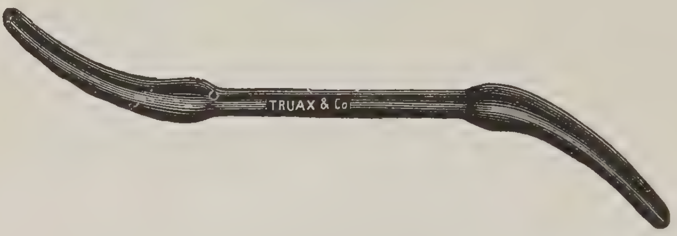
Fig. 48.



Elm Tent, after being moistened and bent, ready for introduction.

When a more extensive dilatation is required, the vagina and uterus may be thoroughly swabbed out with a 5 per cent. solution of carbolic acid or a 1 : 2000 solution of bichloride of mercury, and a long narrow strip of iodoform gauze pushed into the uterus until it fills the entire cavity and projects from the cervix, partly filling the vagina. This may be left for twenty-four hours, and replaced by a larger packing each day until the uterus becomes sufficiently dilated to admit the finger for palpation. These packings should be introduced at the patient's house or at a hospital, and the parts thoroughly disinfected before each packing. The packing should be examined each time for any abnormal secretion that may be found upon the uterine end. Unless the most perfect antiseptic precautions are assured, the packings should not be repeated many times, for the mucous membrane becomes denuded of its epithelium and exceedingly susceptible to septic inflammation. Vulliet was the first to systematically employ intra-uterine packing of this kind for the purpose of dilating and exploring the uterus.

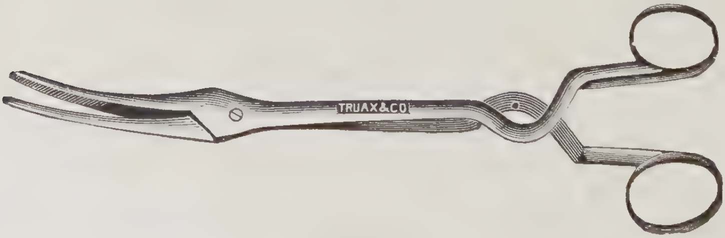
Fig. 49.



Hank's Uterine'Dilator.

Rapid Dilatation of the Uterus for diagnostic purposes is usually made under anesthesia, for which either the Sims' or Simon method of exposing the cervix may be employed. The cervix is drawn forward and steadied by a strong hook or vulsellum forceps. Conical dilators of constantly increasing sizes may then be forced into the uterus until a large curette or a finger can be used to explore the cavity. It usually requires an hour or so to dilate wide enough

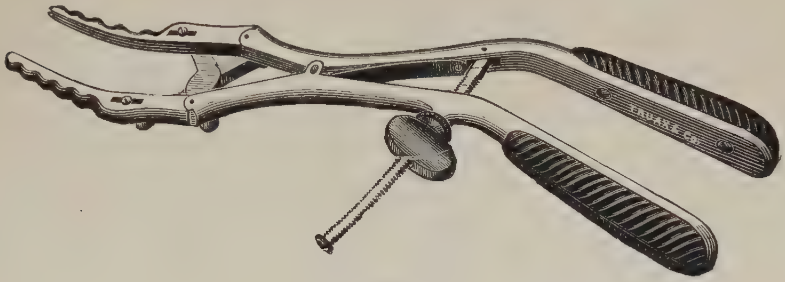
Fig. 50.



Nott's Dilator.

for the introduction of the index finger. In this country the bladed dilators are usually preferred. It is preferable to use two or three sizes of these, first introducing a Nott's or Ellinger's, closed, and expanding the blades until the canal is large enough to admit a larger instrument, such as Goodell's, which in turn is expanded. The dilators should be turned from time to time so as to stretch the cervix antero-posteriorly, as well as laterally, and thus secure a greater and more general relaxation The blades of Ellinger's and Goodell's instruments remain parallel during expansion.

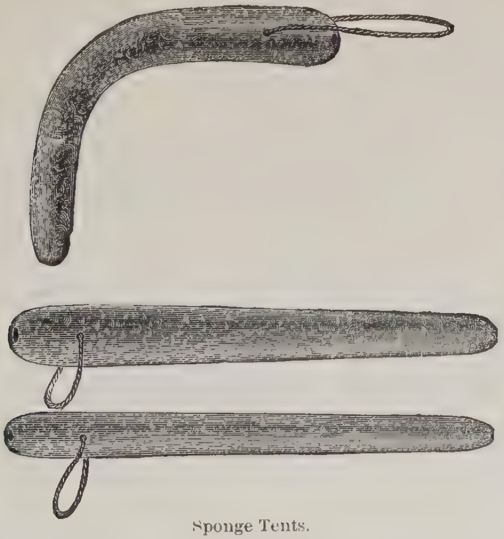
FIG. 51.



Goodell's Dilator.

It is sometimes almost impossible to dilate the nulliparous cervix at a single sitting wide enough to admit the finger to the fundus without lacerating the cervix. Hence in some cases only a moderate dilatation is attempted, and this is followed up by Vulliet's method

FIG. 52.



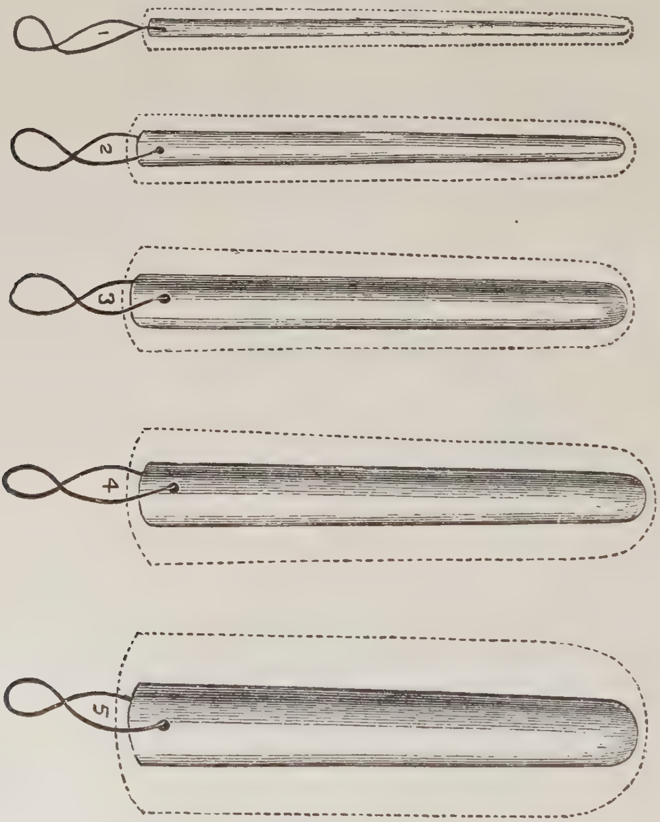
Sponge Tents.

of tamponment. After abortions, or when the uterus is enlarged by growths or relaxed by inflammatory action, wide dilatation is often quite easily and rapidly accomplished.

In other cases in which it is considered necessary to introduce the finger, the cervix is split on either side as high as the vaginal junction with scissors, and the incision deepened within by a probe-pointed bistoury or hysterotome. The incisions are sewed up immediately after the examination. This obviates the bruising of the cervix, yet the internal os and lower uterine segment may be so small that even this method fails to help us much. It is indeed seldom made use of for diagnostic purposes.

Gradual Dilatation by means of sponge tents, tupelo tents, laminaria tents, cornstalk tents, etc. was a once popular method that has now fallen into disuse, except in isolated cases in which the other means cannot be conveniently employed.

Fig. 53.

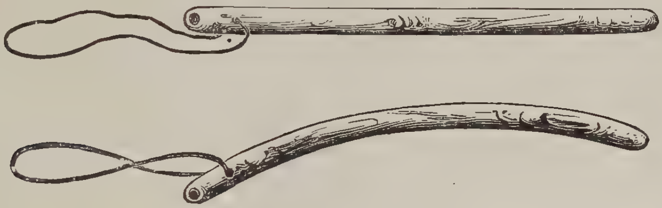


Tupelo Tents.

Sponge tents expand quite rapidly, but they abrade the mucous membrane and sink into the cervical folds, so that portions of them are apt to be left after removal. This, together with the fact that two or three must be successively used to obtain sufficient dilatation, exposes the patient to great danger from sepsis. The mortality attending their use is great; the danger increases with each tent used. A 1 : 2000 bichloride vaginal douche should always precede their introduction and follow their withdrawal. They are best introduced in the lateral position by the aid of a Sims' speculum, and should each be left in situ four or five hours.

Tupelo tents are firmer and expand more slowly and efficiently. They slip out easily, and must be kept in place by a vaginal tampon. The same accidents are liable to happen as in using sponge tents, and the same precautions must be taken.

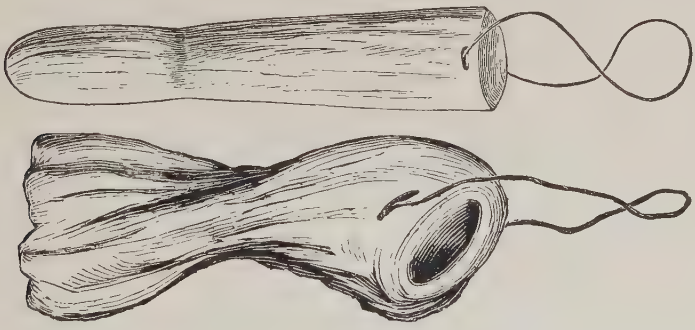
FIG. 54.



Laminaria Tents.

Sea-tangle or laminaria tents often expand unequally, with a constricted zone corresponding to the internal os, which renders their removal difficult.

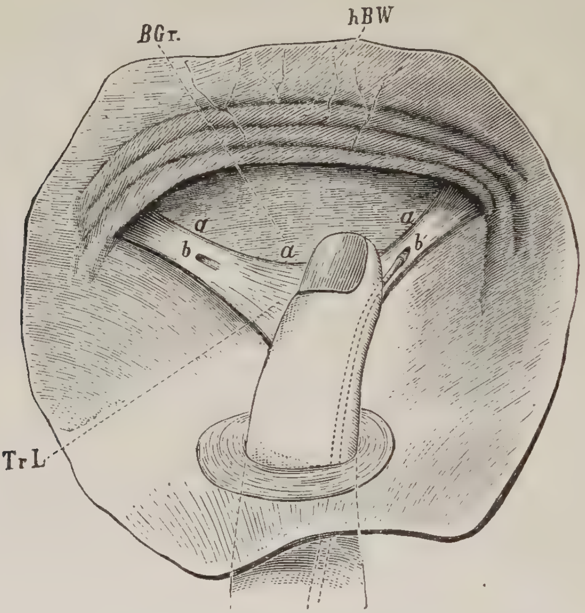
FIG. 55.



Laminaria Tents dilated in the Uterus, showing constriction by the internal os.

Dilatation of the Urethra for digital examination and exploration of the bladder was recommended by Simon, and has been made use of frequently. The danger of incontinence of urine has, however, deterred many from attempting it, and unless an hour or more is taken for the procedure this accident is very liable to follow. Urethral sounds or dilators of graded sizes should be slowly and successively introduced until the little finger can enter the bladder.

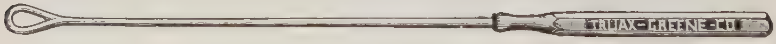
FIG. 56.



Palpation of the Interior of the Bladder. *BGr, a a a,* base of bladder; *b b,* mouths of ureters; *TrL,* interureteric ligament; *hBW,* posterior wall of bladder.

The anterior uterine wall, ureteral mouths, and inner surface of the bladder can be explored. In many cases the ureters can be catheterized. In conjunction with one hand over the abdomen an accurate bimanual examination of the anterior half of the pelvic cavity can be made.

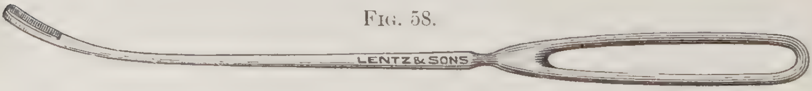
FIG. 57.



Wire Curette.

The Dull Curette is a useful instrument in scraping out retained secundines after abortion, or portions of intra-uterine malignant or adenomatous growths for macroscopical and microscopical examination. The sharp curette is, however, a much safer and efficient

FIG. 58.

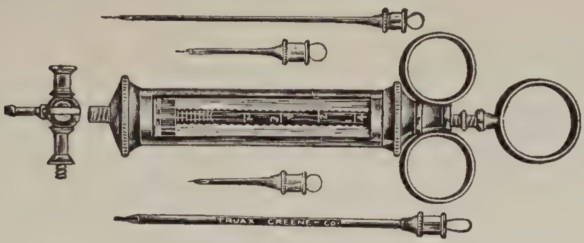


Exploratory Curette.

instrument for this purpose. They can be used after moderate dilatation with conical or bladed dilators. The small exploratory curette may be used for the same purpose, with the added advantage during its use of not being forced to dilate the cervical canal.

The Exploratory Needle or Syringe is a valuable aid in the diagnosis of pelvic abscesses or cystic tumors, when such aid is needed, which is of rare occurrence. It consists of a hollow needle or small trocar that can be attached to a syringe. After an antiseptic vaginal douche the patient is put upon the back, and the sterilized needle pushed into the tumor at a point in the disinfected vagina where no pulsating vessel can be felt. If the needle be a fine one, there will be little danger even if the bladder, rectum, or a small blood-vessel be punctured, except from infection of the cyst contents, if it be not already septic. A few drops of fluid are drawn for inspection.

FIG. 59.



Exploratory Needle and Syringe.

An Aspirator may be used in the same way as the exploratory needle, the chief difference being that more fluid, or even all of it, can be withdrawn.

THE TECHNIQUE OF GYNECOLOGICAL OPERATIONS.

TECHNIQUE, in gynecology, is a word used to designate certain features in the details of an operation essential to its proper performance, and is the most powerful factor in ensuring its success. It has nothing to do with the diagnosis, the prognosis, or the determination to operate, but, having determined to operate, it concerns itself with every act, from the preliminary preparations to the completion of the operation. To assert, therefore, that the technique in a given operation is faultless, is to credit the surgeon with the highest scientific knowledge of his specialty, and the skill to properly utilize it for the benefit of his patient.

Imperfect technique implies errors of omission or commission on the part of the operator which may prove detrimental to the recovery of the patient, even costing her life. With a perfect technique, therefore, the surgeon is acquitted of personal responsibility as to the result, providing his judgment in electing to operate has been good; while if his technique is bad he always stands arraigned before the bar of criticism, and is from time to time directly responsible for the bad results of his work.

The technique of an operation is thus made to include all those features which scientific investigation and consensus of opinion have shown to be conducive to success in the greatest number of cases.

It has nothing to do with dexterity, rapidity, or any other personal element in the operation, but is the basis or pervading principle of the work.

As it is the animating principle of successful operations, it is in the highest degree important to devote a separate chapter in a practical work on gynecology to the consideration of such technical details as are more or less common to operations in general, or to certain classes of operations. The variations in the technique of each individual operation must be left to the systematic description of the operation in its appropriate chapter.

The evolution of gynecology to its present high position as a specialty is due to improvement in the technique of its operations.

In the earliest times there was no technique: the operator treated each case according to his own inclinations. Gradually, as the results of observations accumulated, individual operations crystallized in definite forms, and the technique of the operation was thus established. Further experience demonstrated the existence of certain underlying principles common to groups of operations, and culminated in one grand principle, antiseptic technique. This principle has proved the quickening element in the whole field of modern gynecology, giving life to old operations, calling new operations into existence, and yearly saving thousands of lives.

SEPSIS, ASEPSIS, ANTISEPSIS.

A proper realization of the significance of these three terms to practical gynecology constitutes the very essence of successful scientific work. The cause of death after operation in the vast majority of cases is sepsis or germ-infection. A large percentage of all gynecological cases under treatment are infected or septic.

There is no longer any discussion among intelligent men as to whether certain forms of germs are dangerous and destructive to life, but the question is: under what circumstances do these germs invade the tissues, and what are the best methods for excluding them?

Sepsis is the condition of infection resulting from the presence of one or more specific organisms, such as the Staphylococcus pyogenes aureus, Staphylococcus pyogenes albus, Streptococcus pyogenes, Bacillus colis commune, Gonococcus Neisseri.

Any of these organisms may be found pre-existing in the genital tract; the first and third are found in tubal abscess. The second affects chiefly stitch-hole abscesses. The colon bacillus exists in the intestinal tract, and may occasion a general peritonitis after an operation, if the intestine is seriously wounded. Streptococci are for the most part found in the purulent inflammatory conditions following abortion or puerperal fever.

These are often peculiarly virulent, and a little of the pus remaining in the pelvis is often sufficient to cause the death of the patient by a rapidly-developing peritonitis.

The most harmless pus is that containing gonococci. It is probable that these organisms die early, and for this reason the pus is more or less innocuous. Septic infection is introduced into wounds by the fingers of the operator, instruments, sponges, ligatures, or other objects not properly sterilized.

Asepsis means freedom from septic germs, and is the ideal condition for the hands of operator and assistants and the surgeon's armamentarium.

The surfaces of all objects exposed to the air are coated with germs; the hands not only become contaminated, but the bacteria multiply beneath the finger-nails, and the most virulent germs may thus be easily transported from case to case. Relative to the operation, therefore, all objects not specially prepared and cleansed are germ-infected or septic.

Antisepsis is the application of any efficient means for getting rid of germs. It may be *mechanical,* as by scrubbing or washing; *chemical,* as by the use of carbolic acid or bichloride of mercury; or *thermic,* by boiling water or steam.

Mechanical antiseptic measures are of the utmost value in removing those germs *from the hands* which can be easily dislodged; by this means, however, the hands cannot be rendered sterile or germ-free. This is to be attained by immersing them successively in saturated solutions of permanganate of potash and oxalic acid. The hands should not be introduced into the abdomen without first washing off the oxalic acid in sterile water.

Chemical sterilization by drugs is becoming less and less important. A prolonged immersion of the hands in bichloride-of-mercury solutions as strong as 1 : 500 does not render them so sterile as the permanganate of potash and oxalic acid, yet practically it answers the purpose and is used by a large number of operators. Carbolic acid cannot be used for this purpose in efficient strength without injury. *Sterilization by steam* and *boiling water* have with complete satisfaction replaced all other measures.

An exposure to steam heat at 100° C. or 212° F. for a half hour will destroy all germs in cotton, gauze, bandages, or other dressings. If repeated on two successive days the spores are destroyed, and objects so treated will remain sterile until exposed to contamination. A boiling 1 per cent. solution of the carbonate of soda will sterilize instruments in five minutes without tarnishing them.

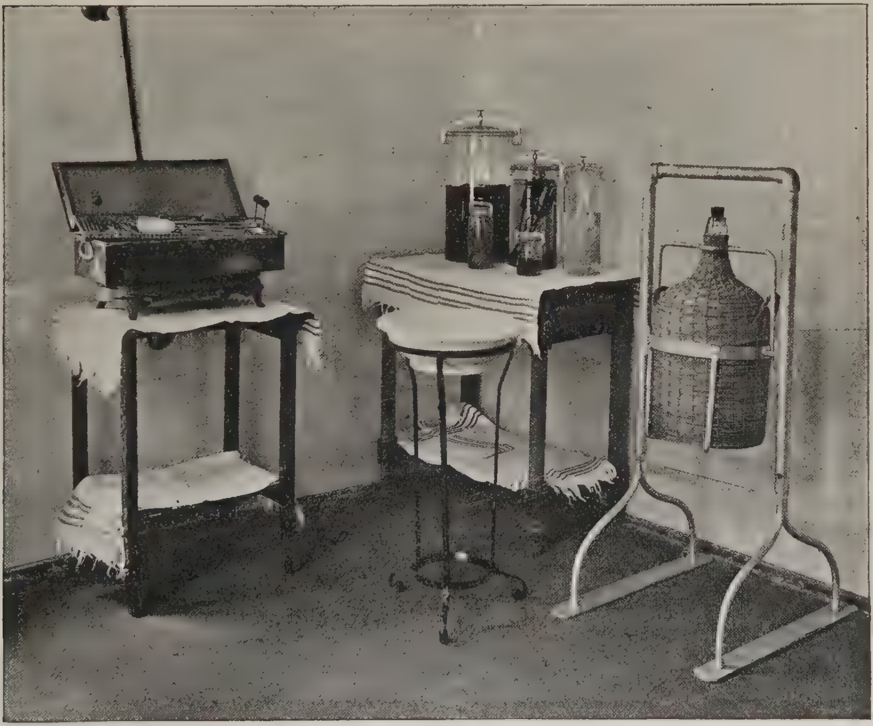
TECHNIQUE IN GENERAL.

1, *Operating-room;* 2, *Surgeon, assistants, nurses;* 3, *Instruments;* 4, *Ligature and suture materials;* 5, *Dressings.*

1. *Operating-room.*—The requisites for a gynecological operating-room are a floor on which water can be freely used, a good illumination, and an abundant supply of hot and cold water. A closely joined wooden floor, if well paraffined, is, with a little care, perfectly satisfactory. The best floor, however, is made of encaustic tile, closely-laid, as it will not absorb moisture.

The light of the operating-room should come from windows on the north and from a large skylight. Too strong light or direct rays from the sun embarrass the operator and spectators by blinding the eyes and throwing the parts below the surface into deep shadows.

FIG. 60.

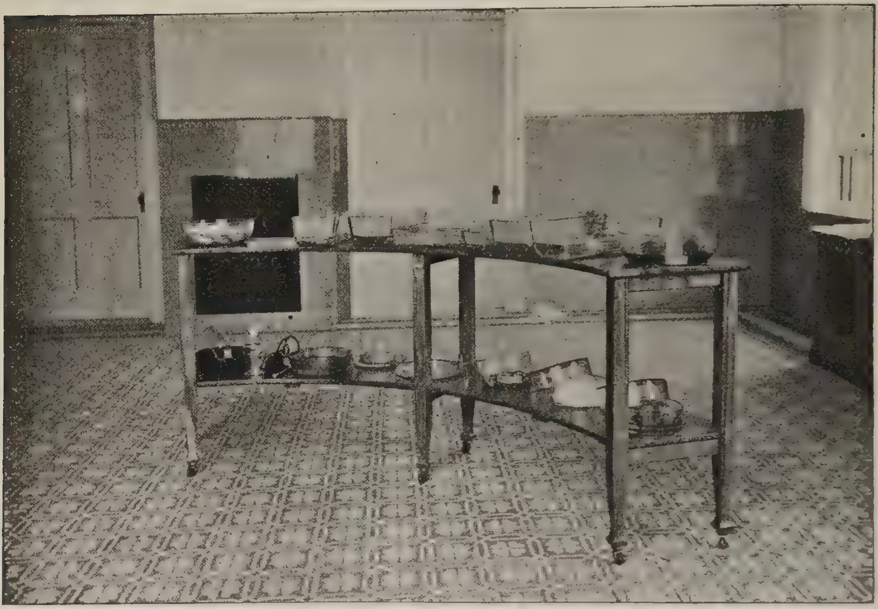


Sterilizer, Demijohn, Basin-holder, Sponges, Drainage-tubes, Syringes, Sutures, etc.

Hot and cold water should be on tap in abundance. Hot water circulating in pipes is usually sterile. Cold water will do for the purpose of preliminary cleansing and for washing the hands, but should in no way come in contact with the field of operation unless previously sterilized by boiling.

If the operating-room is sufficiently large, it may contain several wash-basins, each supplied with hot and cold water, a wash-

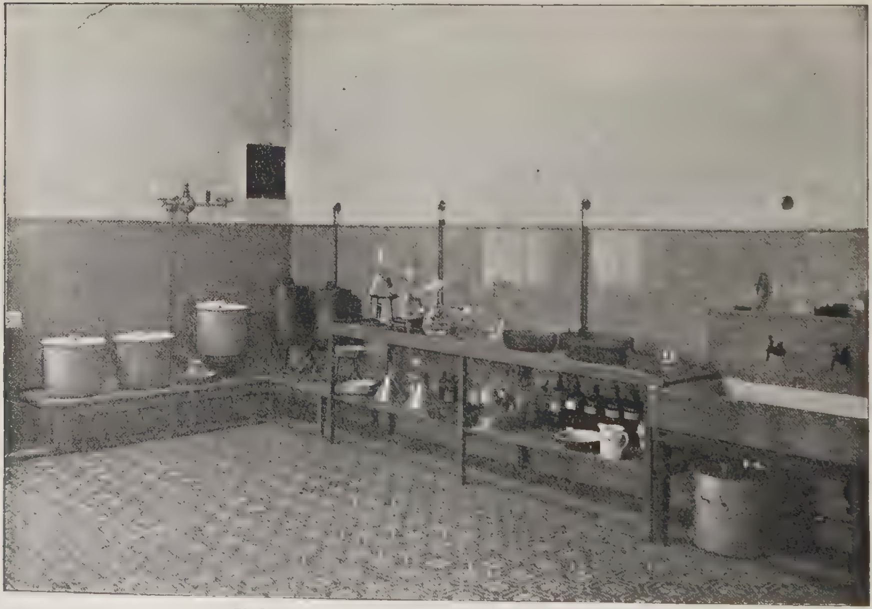
FIG. 61.



Instrument Table with Glass Trays.

sink with a large water-supply and drip-stones near by for dishes, and the apparatus for steam disinfection, also vessels for boiling soda solution, and for boiling water.

FIG. 62.

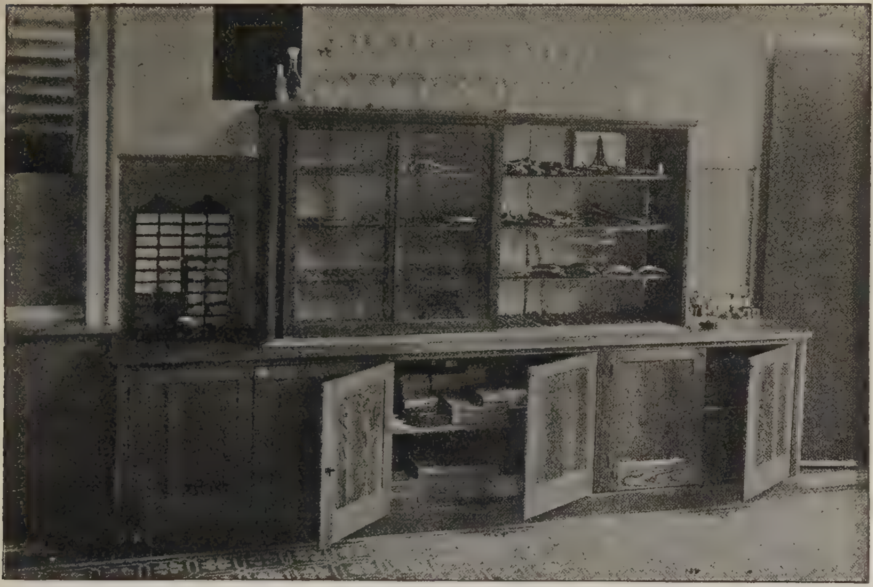


Sink, Sterilized Water, Arnold's Sterilizer, etc.

In another part of the room ligatures, gauze drains, sponges, and sterilized gauze and cotton are stored on shelves along with the glassware.

The instrument-case should be provided with glass shelves, as they are easily kept clean and expose all the instruments to view. The instruments should be properly classified in groups—scissors, knives, forceps, etc.; the artery forceps are most conveniently kept in a small space by bunching six or eight on a key-ring.

Fig. 63.



Instrument-Case and Sterilized Water in Bottles.

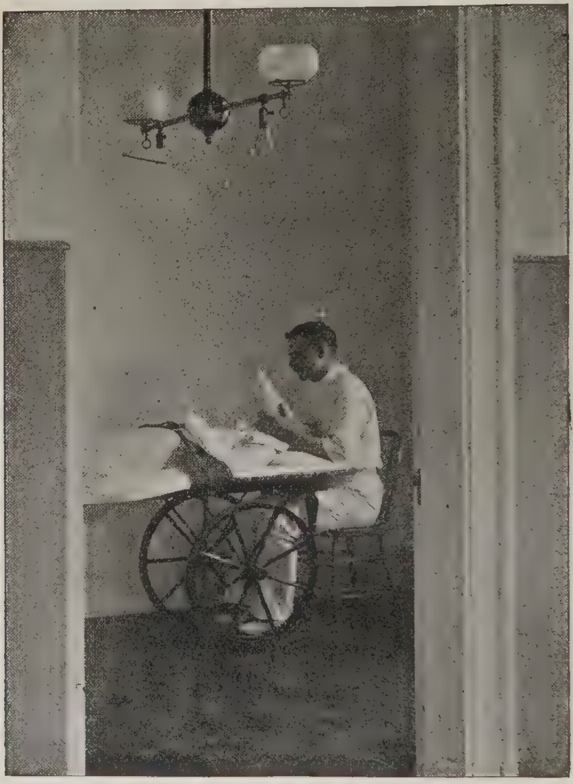
Adjoining the operating-room is a small room for the administration of anesthesia. The patient is brought here from the ward and anesthetized without witnessing any of the preparations which have been made for her reception in the operating-room.

After each operation the floor is cleansed by mopping with water. Occasionally the walls should be gone over with a damp cloth. A good enamel paint will resist the discoloring effects of the moist atmosphere of the room.

Some operating-rooms are conveniently arranged with subsidiary rooms in which all the preparations for an operation are made, leaving the room for the operation perfectly clear for operator, assistants, and spectators. This is the more convenient arrangement where the operations are frequently performed in the presence of large classes. These same principles may be carried out in a private residence as efficiently, if not so elaborately, as in the hospital.

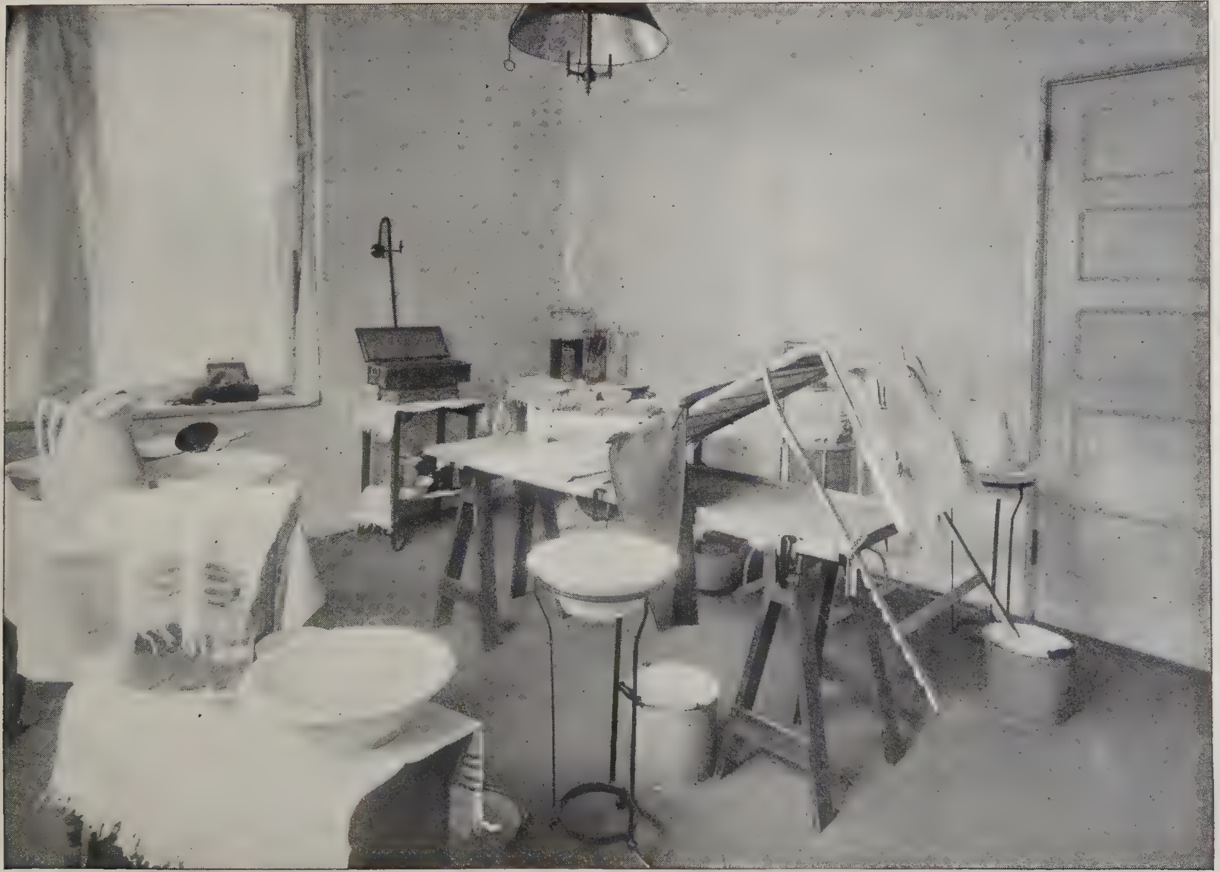
The accompanying cut of one of the operating-rooms of the Gynecean Hospital, Philadelphia, prepared for an operation, shows at a glance how easily and simply the indications can be met. It will be seen that there are but few articles in the room which cannot be obtained or substituted in any well-regulated private residence. A plain kitchen table may be made to answer the purpose of the operating-table. If it is desirable to use the Trendelenberg position, a Krug frame can readily be taken to the house in the physician's carriage. Instruments may be boiled in any conveniently-sized tin basin. Five- or ten-gallon demijohns of distilled water are readily obtained, but if not, boiled water will answer all purposes just as well. If it be muddy, it should of course be filtered.

Fig. 64.



Etherizing Room. Patient being etherized.

PLATE IX.



Operating-room of the Gynecean Hospital prepared for an operation.

THE OPERATOR AND HIS DIRECT ASSISTANTS.

The responsibility of the operator and his assistants does not begin, as it is commonly believed, in the preparation immediately before the operation. It is a duty constantly devolving upon all persons who come in direct contact with wounds of any sort, to avoid in every possible way and at all times unnecessary contact with septic matter. Unhealthy or suppurating wounds should never be touched with the fingers when it is possible to avoid it; dressings of such wounds should be removed and replaced by forceps.

The gynecologist has no right to conduct post-mortem examinations or handle pathological specimens. When contact with possibly infected objects is necessary, the lodgment of infection in the skin and under the nails should be prevented as far as possible by coating the surface of the fingers and hand with vaseline, and making the contact as brief as possible; and this should be followed immediately by a thorough scrubbing in clean warm water.

The surgeon and his assistants, like obstetricians, should avoid the habit of wearing gloves which cannot be washed. Contamination is sometimes, undoubtedly, conveyed by examining a septic case, hurriedly washing the hands, and drawing on gloves which become thus contaminated, and which in turn reinfect the hands each time they are worn.

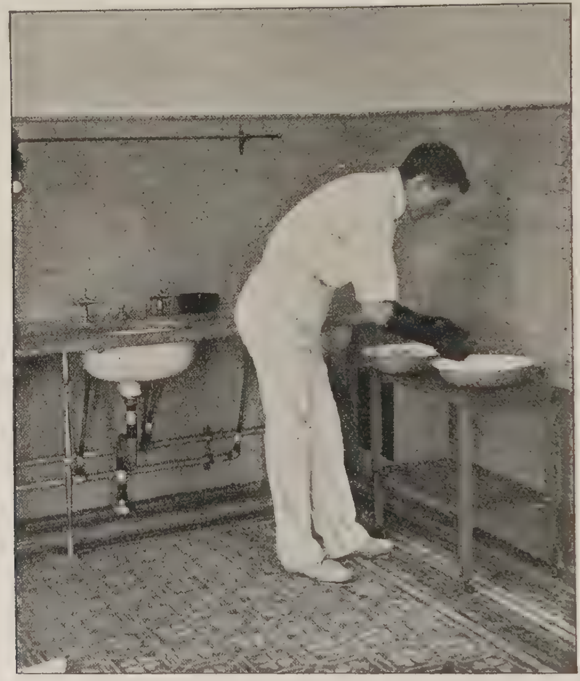
Both surgeons and assistants should bathe frequently and wear clean apparel. It adds to the comfort, as well as harmonizes with the sense of cleanliness, if the surgeon can step from his bath into his operating suit. Operating suits for surgeon and assistants should be made of stout butcher's linen. The jacket should be open in the back; the pantaloons may be separate or attached to the jacket. Tapes should be used in place of buckles for the pantaloons. The sleeves should be short, reaching to within two or three inches of the elbow. Before putting on the suit the outer clothing should be removed down to the under-clothes. It is in better keeping with the appearance of the rest of the costume to wear white canvas shoes with rubber soles. The nurses must wear wash dresses with fresh white front and *short sleeves.*

For operations in private houses aprons of stout butcher's linen sufficiently long to cover the clothing from the neck to the ankles will give the proper amount of protection.

Cleansing the Hands and Forearms.

The first duty after entering the operating-room is to cleanse the hands and forearms thoroughly at the basins with a stiff scrubbing-brush, common brown kitchen soap, and warm water; frequently changing the water. The best brushes for this purpose are made of vegetable fibre and cost but twelve or fifteen cents apiece. At least ten minutes must be spent in scrubbing the hands and forearms, paying especial attention to the finger-nails.

FIG. 65.



Sterilization of Hands with Permanganate of Potash: Costume of Operator and Assistants.

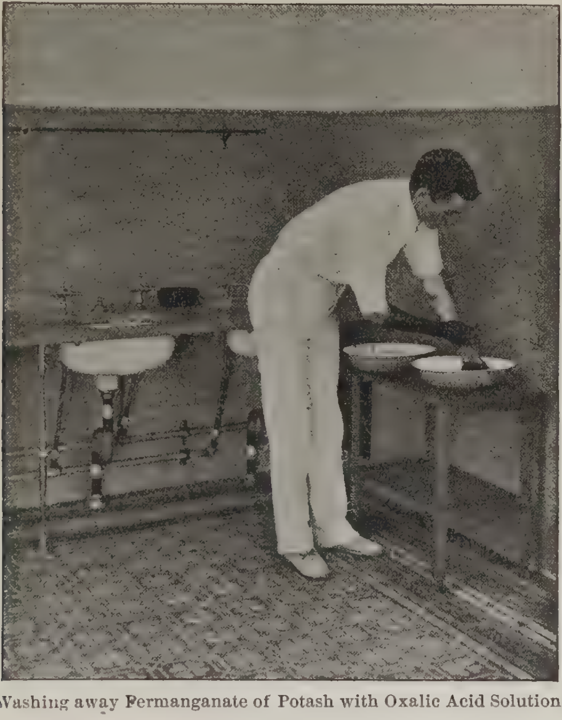
After washing the hands and forearms they are covered with a hot saturated solution of permanganate of potash until they are stained a deep mahogany-red, when they are immersed in a hot saturated solution of oxalic acid and moved about until all the stain of the permanganate is removed. The hands may then be immersed in milk of lime or in plain water to wash off the oxalic acid. The nurses who handle sponges, gauze, prepare ligatures, etc. must also wash and sterilize their hands in the same way.

A common and excellent substitute for this method of sterilization is to bathe the hands and arms in alcohol after scrubbing them with the nail-brush and soap. They are then soaked in a strong bichloride-of-mercury solution (1 : 500) for five minutes, and the bichloride is finally washed off with distilled water.

After such a preliminary sterilization the operator must avoid, as far as possible, contact with non-sterilized objects, such as lids of jars and vessels, door-handles, tables, or the patient; above all must such inconsistencies be avoided as shaking hands with visitors, putting the hands in the pockets while waiting, etc.

When necessary to come in contact with the patient, as in placing her on the pad, in rearranging her clothes, or in removing bandages, the hands must again be sterilized by washing for two minutes, omitting the permanganate of potash and oxalic acid solution.

FIG. 66.



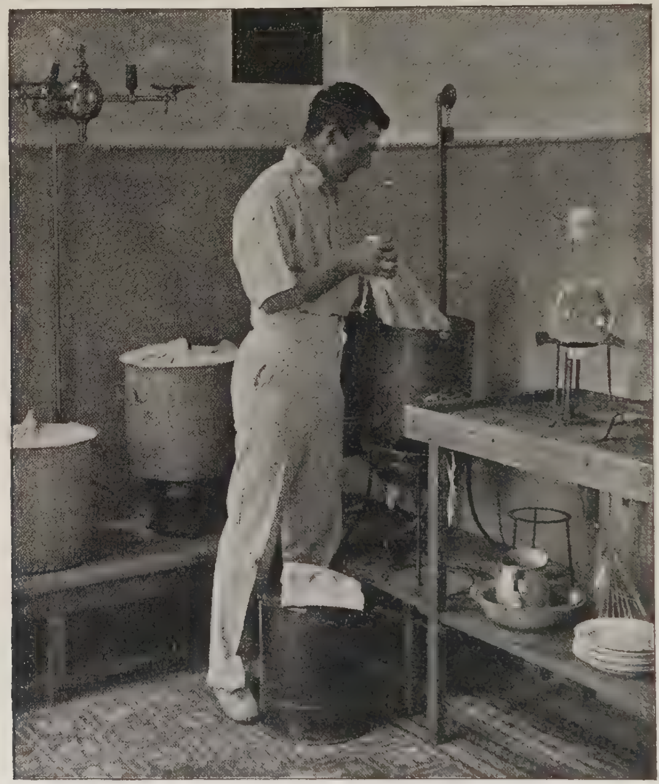
Washing away Permanganate of Potash with Oxalic Acid Solution.

INSTRUMENTS.

After each operation the instruments are immersed in hot water and scrubbed with brown soap and a scrubbing-brush. They are then rinsed in hot water and placed upon a clean dry towel, and rapidly dried, the heat from the water assisting in this process.

After drying the instruments they are classified in separate groups on the shelves in the instrument-case. Before the next operation they are collected in a linen bag and placed in the sterilizer. If the operation has been a septic one, they are sterilized before putting them away, and again just before the succeeding operation. The sterilization of instruments is simply and efficiently effected by boiling them in a solution of carbonate of soda, of 1 per cent. strength, for five minutes. The bag is then picked up by the draw-string, which has been left hanging out over the edge of the vessel, and carried to the instrument dishes, into one of which it is emptied. If a wire or perforated tray be used upon which they are boiled it may be lifted from the sterilizer, placed on the instrument-table, and the instruments used directly from it. Cold water is poured over the instruments, and when cooled they are appropriately classified. The instruments should be kept bright and free from tarnish by the occasional use of a fine soap, such as sapolio, used for polishing metallic surfaces.

FIG. 67.



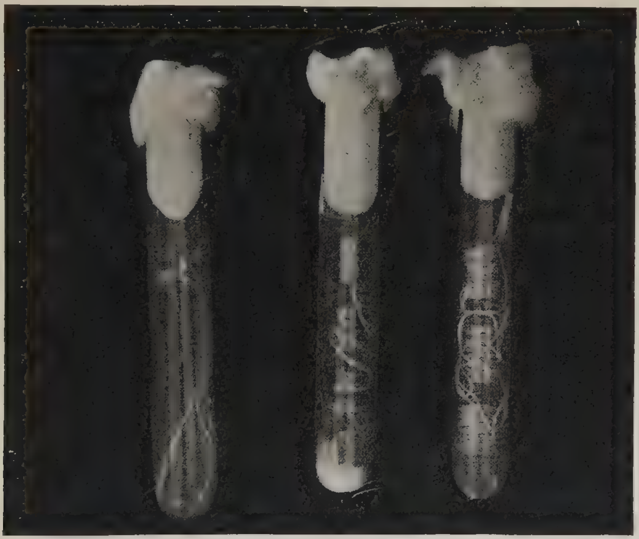
Placing Instruments in Arnold's Sterilizer, in Linen Bag.

LIGATURES AND SUTURE MATERIALS.

The ligature and suture materials used in gynecology are silk, catgut, and silkworm-gut.

Silver wire, much used formerly, is now more than replaced by silkworm-gut, which possesses all of its advantages with none of its disadvantages, and in addition has other points of superiority. Tendon sutures, while excellent, are too expensive to come into general use. The silk should be of the twisted Chinese variety of three grades—fine silk, used as carrier threaded in a loop, by means of which the sutures are pulled through the tissues; intermediate silk, for all ordinary purposes of suture and ligature, even for ligating the ovarian and uterine arteries and approximating the edges of the stump in hysterectomy for myoma; and heavy silk, for ligation in vaginal hysterectomy.

FIG. 68.



Silk in Tubes for Sterilization.

The *silk* is sterilized by placing it in stout glass tubes made for this purpose, or in pieces of stout glass tubing an inch in diameter, plugged at both ends with cotton. The silk should be cut in convenient lengths and rolled loosely on glass reels which fit the inside of the tube. The tube is then placed in the sterilizer, steamed for an hour, taken out, and the process repeated a half hour on two succeeding days. The cotton is left in place until the sutures are ready for use. The ligatures are sterilized by this fractional sterilization with absolute certainty, as this is the method employed in the bacteriological laboratory for sterilizing culture media. It must not be forgotten that the steam penetrates the cotton and circulates with perfect freedom in the tube.

Of the sterilizers thus used, that of Arnold is the best for transportation and for clinics not fitted with special conveniences.

Where steam is constantly circulating through the establishment, it may be conveniently utilized for sterilization by tapping the pipe into a copper cylinder. A coil of pipe filling the inside of the cylinder, also connected with the steam system, serves to keep up a high temperature, and to dry out the dressings when the free steam is turned off.

Silkworm-gut is sterilized in the same manner as the silk. It should be assorted into light and heavy sizes.

Catgut.—Catgut is ruined by water or steam, and requires therefore a different mode of sterilization. The method commonly adopted is by prolonged boiling in alcohol from one to several hours. The best apparatus so far devised for this purpose is David's, in which the vapor of the alcohol is recondensed and the loss of alcohol largely prevented. Very heavy catgut is dangerous, and should never be used, no matter how prepared. Fine and intermediate catgut may be used for buried ligatures or sutures, after sterilization in alcohol for an hour the first day and a half hour on two successive days. It is most convenient to roll it on glass spools and preserve in glass-stoppered jars filled with alcohol. At the time of operation the jar is opened and the catgut with the alcohol turned out into a small glass dish. It must not come in contact with water.

The method of sterilization by boiling in alcohol is still on trial. Theoretically, it would seem to be unreliable. Alcohol boils at 173° F., which is not sufficiently high to kill the spores of some germs with which the material is liable to be infected. A common substitute for this method of sterilization of catgut is to immerse it in ether for from two to seven days, changing the ether several times during this interval. From the ether it is transferred into an alcoholic solution of bichloride of mercury, 1 : 100, in which it is allowed to remain for forty-eight hours. It is finally transferred into a solution of 1 part of the oil of juniper wood to 2 parts of alcohol, where it is kept, securely corked, until needed, when it is immersed in commercial alcohol an hour before using. Gut prepared in this manner is free from septic matter, although it is liable to be weakened by the preparation.

Dressing, Sponges, etc.

Gynecological dressings consist of absorbent cotton, simple, sterilized, and iodoformized gauze, and abdominal and T-bandages.

Sponges are prepared by pounding them in a wooden bowl to loosen the grit, and then washing them in warm water until the water remains clear. It may be necessary to change the water eight or ten times. From the water they are transferred to dilute muriatic acid (ʒii to Oj) and allowed to stand for twenty-four hours. This part of the process is necessary to remove all chalky particles. From the hydrochloric acid they are passed quickly through permanganate of potash solution (5 per cent.), which stains them a dark purple, which in turn is decolorized by immersing the sponges in oxalic acid (saturated solution). Before transferring the sponges to the oxalic acid solution the hands should be disinfected after the same method as for operation, as the permanganate of potash and oxalic acid are the essential factors in the process of sterilization, and the sponges must not be contaminated from this stage on. From the oxalic acid solution, where they have remained only a sufficient time to effect decolorization, they are transferred to sterilized lime water, which neutralizes the acid, and then into bichloride-of-mercury solution (1 : 1000) for twelve hours, after which they are rinsed twice in sterilized water and preserved in carbolic acid solution (3 per cent.), until they are desired for use.

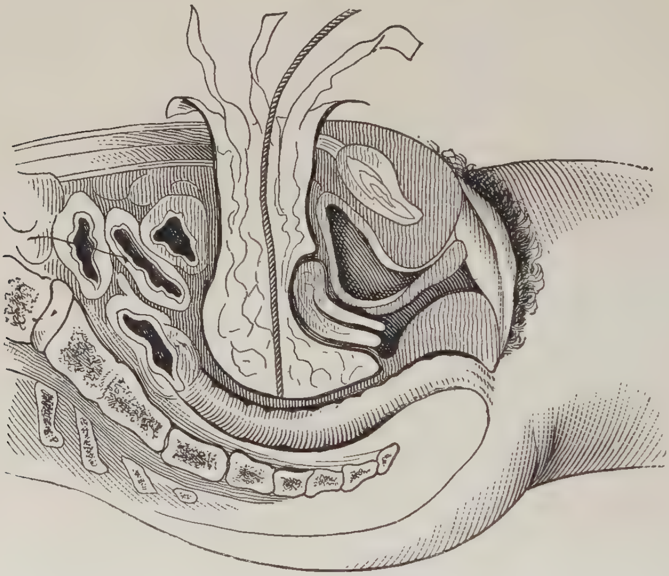
After being washed free from the hydrochloric acid another good method for cleansing is to immerse the sponges in a saturated solution of washing soda for forty-eight hours, from which they are taken, thoroughly washed free from the soda, and placed in alcohol, in which they are kept until used. After being soiled at one operation they may be prepared for further use by passing them through the saturated soda solution and allowing them to soak for twelve hours in a solution of sulphurous acid, sufficiently strong to be sour to the taste. They are then transferred to the alcohol.

Absorbent cotton is unrolled from the bales in which it is bought and cut into pieces of various sizes or made into loose balls. The large pieces are laid in a towel which is pinned together, so as to completely protect the cotton. The balls are sterilized for an hour in a glass jar, which is left open during the process; at the end of this time the free steam is cut off and that circulating through the coil allowed to dry them out thoroughly.

Gauze.—Gauze is bought in rolls of one hundred yards each, at a little over three cents a yard. It is cut into strips of several yards' length, and then sterilized in the same manner as the cotton and other dressings. Both gauze and cotton are used preferably by many operators after they have been impregnated with bichloride of mercury. Such material should never be used inside the peritoneal cavity. It may be bought already prepared in the shops.

Iodoformized gauze is prepared by impregnating rolls of sterilized gauze with an emulsion of iodoform in soapsuds and water.

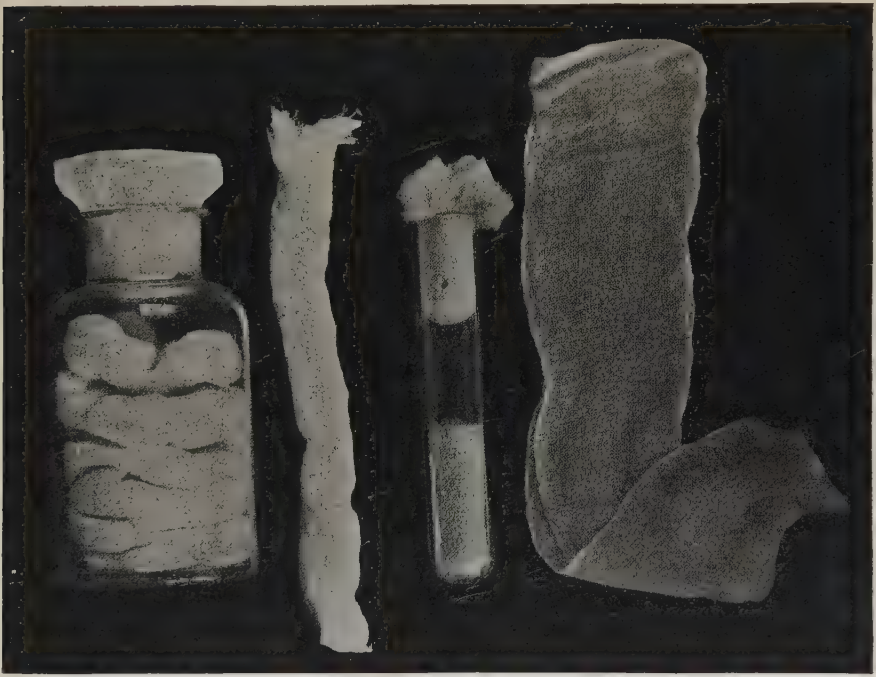
FIG. 69.



Mikulicz Drain.

The Gauze-bag or *Mikulicz Drain.*—This is one of the most efficient forms of abdominal drainage, and possesses the advantage over the glass tube in that it acts continuously and takes care of itself, while tubes require constant attention and are liable to convey sepsis down into the pelvis, as well as to perforate the bowel by the pressure made by the end of the tube. The gauze bag should be one or two inches in diameter and about eight inches long, with a string tied to its bottom. This is loosely filled with three or four long strips of gauze, about two and a half inches wide, which project from the top of the bag. When desired for drainage the bag is laid in the back of the pelvis across the area to be drained, if it be extensive, and is then brought up over the top of the uterus and out through the incision, and is cut off about an inch beyond the wound. The drainage is effected by capillary attraction which carries the discharge to the surface, where there must be an abundance of sterilized cotton to take it up. In one or two days the strips are slowly drawn out with a pair of sterilized forceps, and traction is made upon the string which inverts the bag, and thus effects its removal. The part of the incision left open by the removal of the bag is then closed by a provisional suture placed in the track of the drain at the time of operation.

Fig. 70.



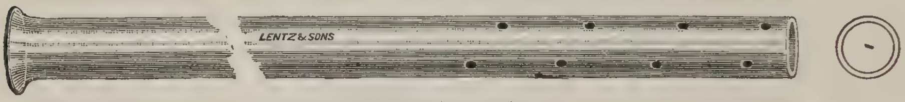
Gauze Drains.

Roll-gauze drain is useful where long areas of denudation extend along the intestines or over into the flanks. This is made by forming a piece of gauze a yard long into a loose roll about three-quarters to one inch in diameter. Pieces of the length desired can be cut off or as in some cases the whole roll can be used.

Although efficient, these drains are difficult to remove and cause the patient much distress, as they cling so closely to the skin and underlying tissues.

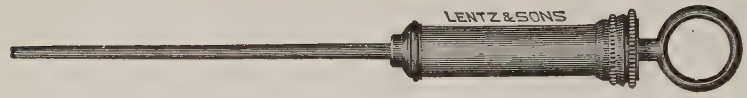
Glass drainage is probably used more frequently than gauze, but in careless hands it is exceedingly dangerous, and should be avoided, except when the surgeon can be absolutely sure that its care is in competent hands. The drainage-tube should be about six inches in length and of a calibre just sufficient to admit the nozzle of the syringe used in cleansing it. The object of the tube is to keep the cavity to be drained perfectly dry. To accomplish this it is necessary, at times, directly after the operation, to cleanse the tube every fifteen minutes. In the course of a few hours the intervals of cleansing are lengthened, until it is not repeated oftener than three or four times a day. The tube is removed as soon as the discharge assumes the straw color of the normal peritoneal fluid, and the amount is diminished to a few drachms at each cleansing. The tube is kept dry, while *in situ*, by passing a long-nozzled syringe to its bottom and removing the accumulated fluids by suction. Before and after each cleansing the mouth of the tube and the rubber-dam through which it projects must be carefully washed with a piece of cotton dipped in bichloride-of-mercury solution; the syringe should be disinfected both inside and out with bichloride solution and boiling water. The hands of the person cleansing the tube must be carefully disinfected before each dressing, no matter how often repeated. In no other way can the safety of the patient be ensured. Fresh sterilized cotton is placed over the mouth of the tube each time it is disturbed, and is held in place by a square piece of rubber-dam, through the centre of which the free end of the tube protrudes.

Fig. 71.



Glass Drainage-tube.

Fig. 72.



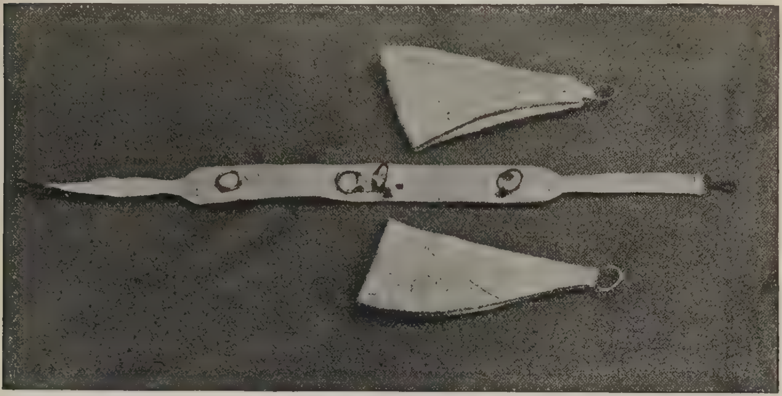
Hard-rubber Syringe, for cleansing drainage-tube.

Plastic Operations.

Preceding a plastic operation upon the vagina the bowels should be thoroughly evacuated by two or three free purgations, started with a laxative, such as a pill composed of aloes gr. j, belladonna gr. $\frac{1}{6}$, and strychnia gr. $\frac{1}{30}$, taken thirty-six hours before the time of operation, followed, if necessary, by citrate of magnesia. A Seidlitz powder twenty-four hours before operation followed by a rectal enema the next morning is also efficient.

Occasionally the action of the purgative is delayed and feces are evacuated over the operator's person from time to time during the operation; this can be overcome temporarily, in persistent cases, by passing a suture twice through the anus.

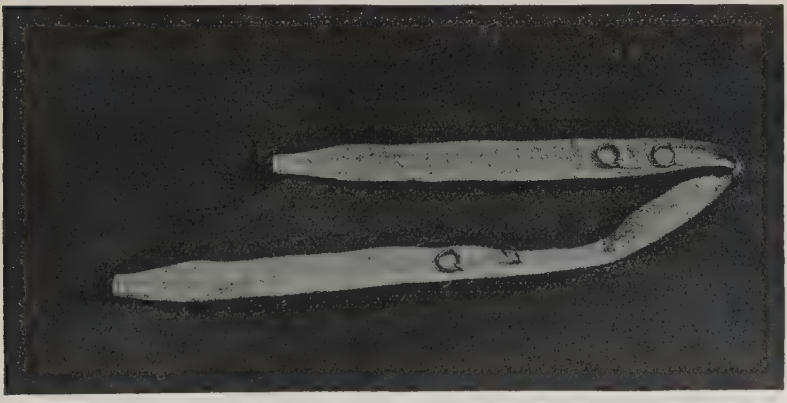
Fig. 73.



Kelly's Leg-holder.

In perineal, vaginal, and rectal operations the patient is brought down to the edge of the table, with the thighs well flexed on the abdomen and held in this position by a leg-holder. The simplest form of leg-holder is Kelly's or Robb's modification. In the former, one of the loops is placed under the knee and into this the

Fig. 74.



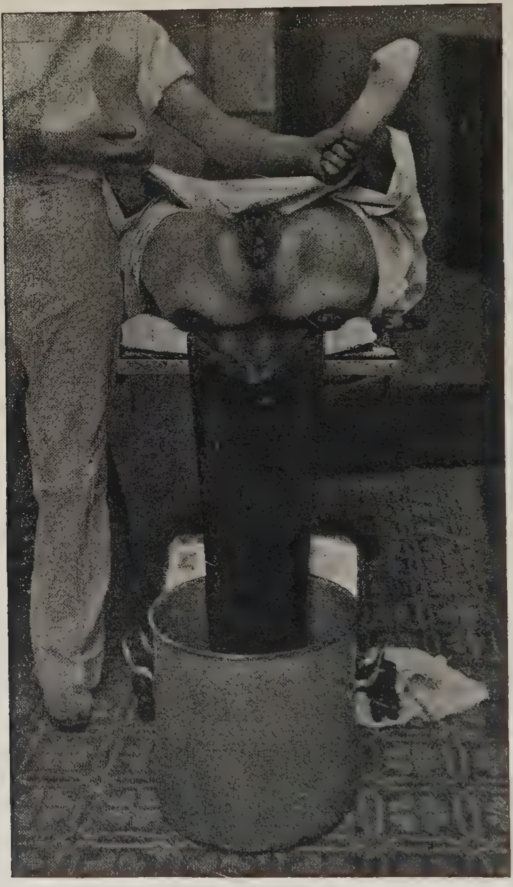
Robb's Modification of Kelly's Leg-holder.

shoulder-strap is hooked and drawn under the arm, around the back of the neck, down over the opposite shoulder, and hooked in the loop under the opposite knee.

The leg-holder may readily be dispensed with and an assistant's hands substituted.

The perineal pad is next inflated and placed under the buttocks, with the apron dropping into a bucket at the foot of the table.

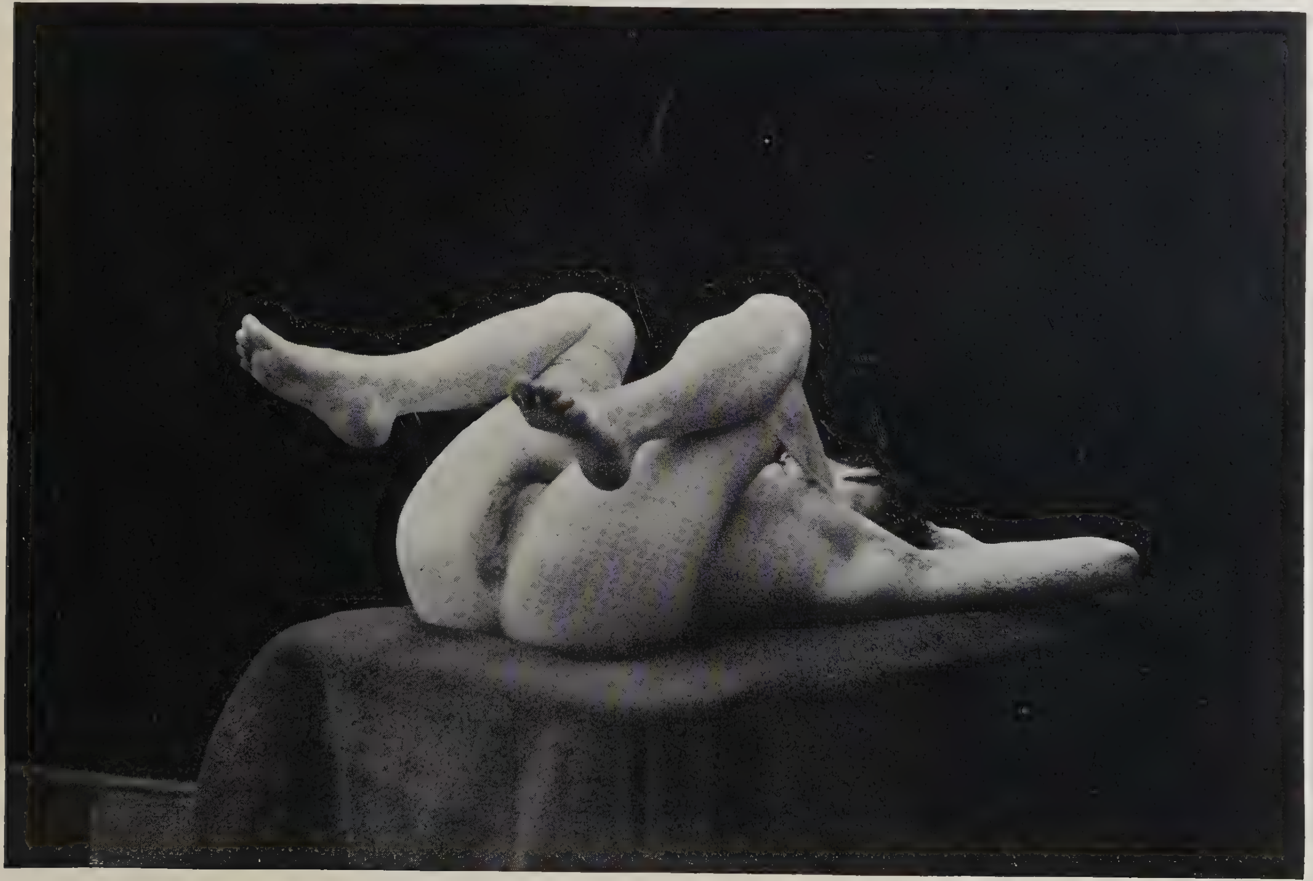
FIG. 75.



Assistant Supporting Legs.

In vaginal operations the preparatory cleansing is conducted as follows: The external genitals are thoroughly soaped, and this worked up into suds with warm water; the hair is next shaved off the vulva, although this procedure is by no means absolutely necessary, provided the operator takes sufficient care to render the hairs thoroughly aseptic; a longer time must therefore be spent in

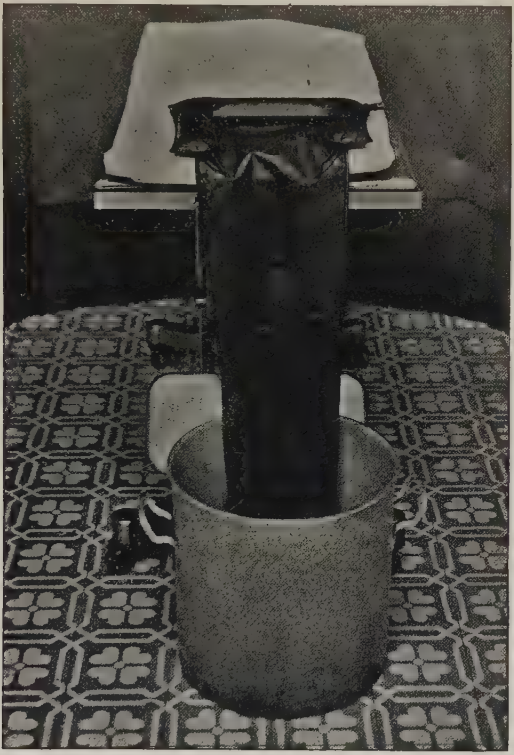
PLATE X.



Leg-holder Applied with Patient in Dorsal Position.

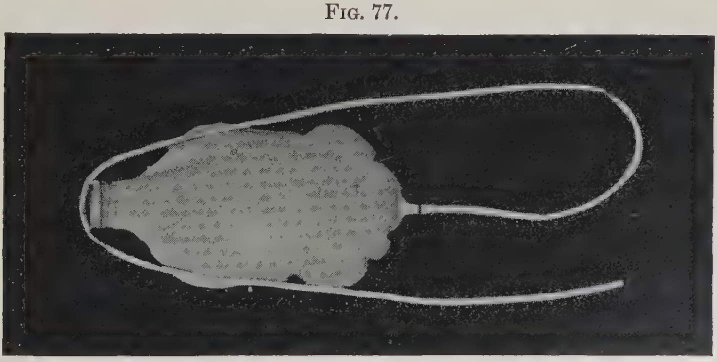
the disinfection. The vagina is thoroughly cleansed with soap and warm water. A 10 per cent. solution of creoline makes an excellent detergent, if applied vigorously by means of a ball of absorbent cotton in the grasp of a pair of forceps, so as to repeatedly stretch out and cleanse every little fold and rugosity. The parts around the field of operation are protected in the following manner: A

Fig. 76.



Perineal Pad in Position.

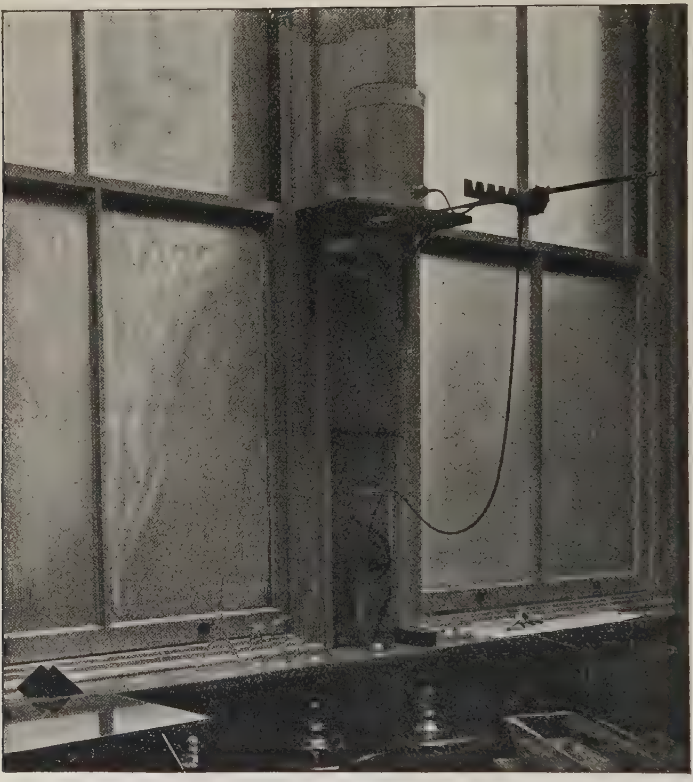
Fig. 77.



Fountain Syringe used for Irrigation in Private Practice.

diaphragm composed of three or four thicknesses of gauze is laid over the vulva, inner surfaces of the thighs and buttocks, reaching well down below the border of the table. Through a slit in the centre of this the operation is performed. The legs of the patient are covered with loose, sterilized stockings reaching above the knees, where they are tied with draw-strings.

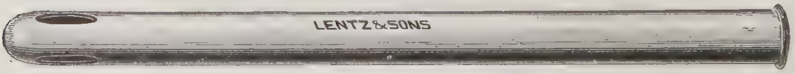
Fig. 78.



Glass-jar Irrigator.

The irrigator is of great service in perineal work. By its use sponges are dispensed with, and the blood which is at once diluted fails to clot, and does not cling to the fingers.

Fig. 79.



Baldy s Irrigating Tube.

The best form of irrigator is a large glass jar placed on a shelf three feet above the head of the operator.

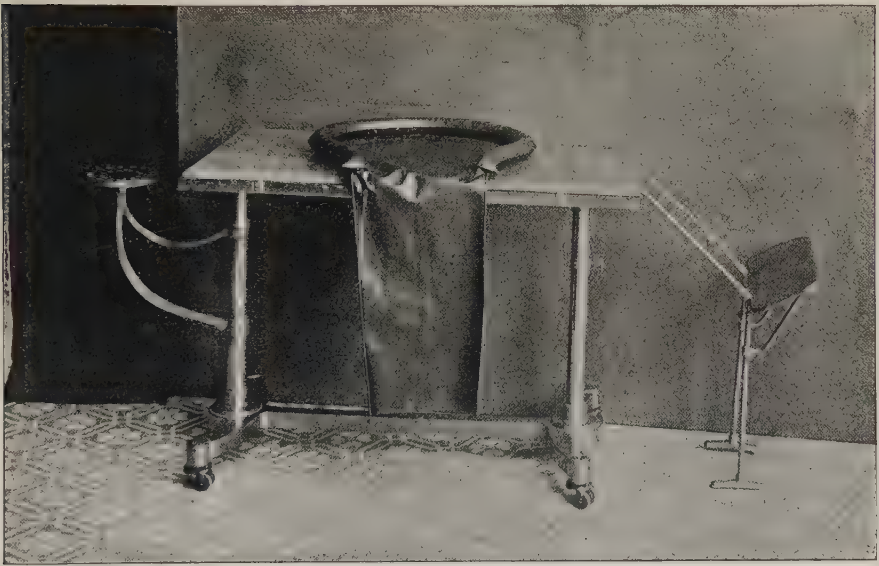
An opening near the bottom provides for the escape of the water, which is conducted through a rubber tube ending in a glass nozzle, with an intervening stopcock.

The Technique of Abdominal Operations.

The technique of abdominal operations begins with the preparatory treatment of the patient immediately before operation, and includes all the details in the preparations for, and the conduction of, the operation. Certain features are common to all abdominal operations. Of these, but two will be described: the opening and closing of the abdomen.

Preparatory Treatment.—It is necessary to begin in some cases weeks beforehand, if the patient be in an enfeebled condition and there is a good prospect of building her up for the operation. The most important elements of the treatment are rest in bed, digestible diet at frequent intervals, stimulants if well borne, regulation of the bowels, quickening the activity of the skin by baths, massage, and electricity. In other cases, where the general condition is good, a delay of but one or two days is necessary in which to bathe the patient and thoroughly evacuate the bowels. Almost all chronic cases, not excluding pelvic abscess, will be benefited by preparatory treatment.

Fig. 80.

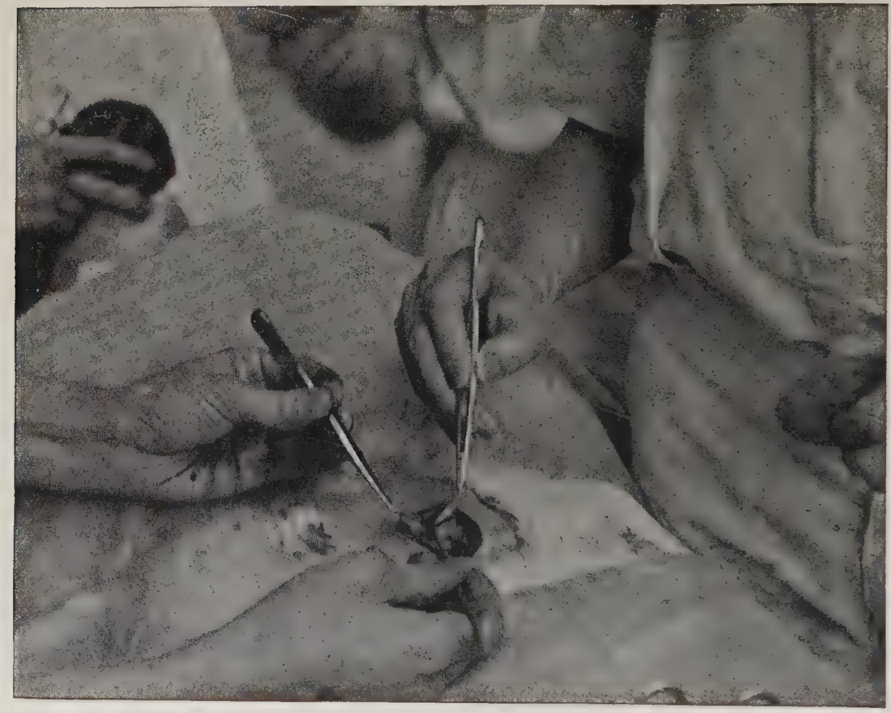


Operating Table with Ovariotomy Pad in Position.

Such cases as extra-uterine pregnancy with internal hemorrhage, rupture or strangulation of a cyst, or rupture of an abscess, call for immediate operation. Here all the advantages of rest and preparation are subordinate to the paramount danger which is momentarily threatening to destroy life. Frequently it will be necessary to give the patient an anesthetic, and without preliminary preparation lift her on to the ovariotomy pad upon the table, where the vagina is douched out with a strong boric-acid solution, or a 10 per cent. creoline solution, or a 1 : 1000 solution of bichloride of mercury. The mons veneris is then shaved well down to the labia, the abdominal walls scrubbed, and cœliotomy performed at once.

Opening the Abdomen.—This is the one step common to all abdominal operations, and may therefore be described as a part of the technique in general.

Fig. 81.



Opening the Peritoneum.

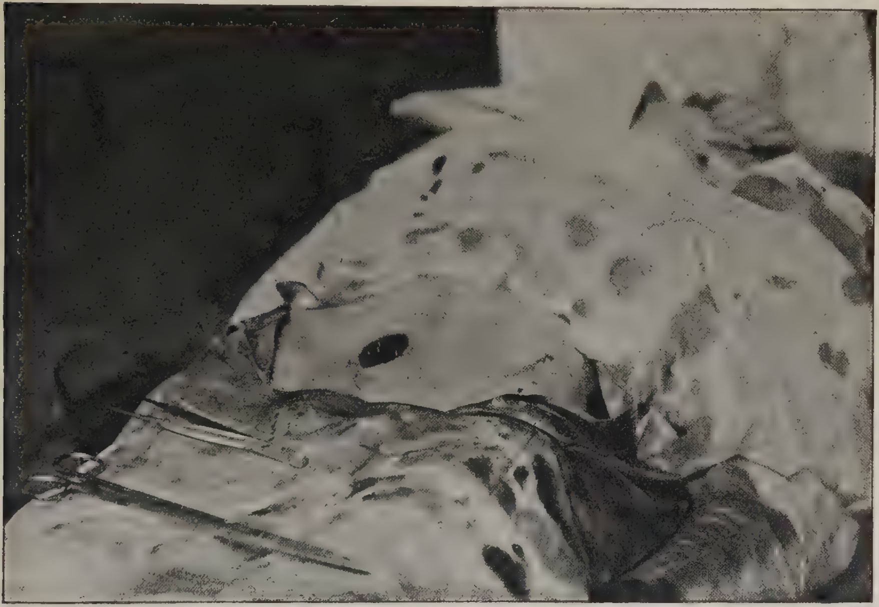
The usual location for the incision is in the median line between the umbilicus and pubes, nearer the pubes.

The abdomen is to be thoroughly washed in the ward, by first scrubbing with soap and hot water with the aid of a nail-brush, followed by alcohol and ether, and this by a strong bichloride-of-mercury solution (1 : 1000). The abdomen is covered with a pad of sterilized gauze, to prevent contamination of the skin from the patient's night-gown, etc. in transporting her to the operating-room.

The patient is placed on the table with her hips resting on Kelly's ovariotomy pad, the apron of which hangs over the side of the table into a bucket. The feet rest on a support at the end of the table.

The vagina is now douched, or in event of a hysteromyomectomy (hysterectomy for "fibroids") washed thoroughly with soap and water, followed by bichloride-of-mercury solution (1 : 1000), and finally packed with iodoform gauze. The assistant now cleanses the abdomen by first scrubbing it with a ball of cotton and soap and warm water, then with pure alcohol, followed by ether, and finally with sterilized water.

Fig. 82.



Short Incision in Abdominal Wall.

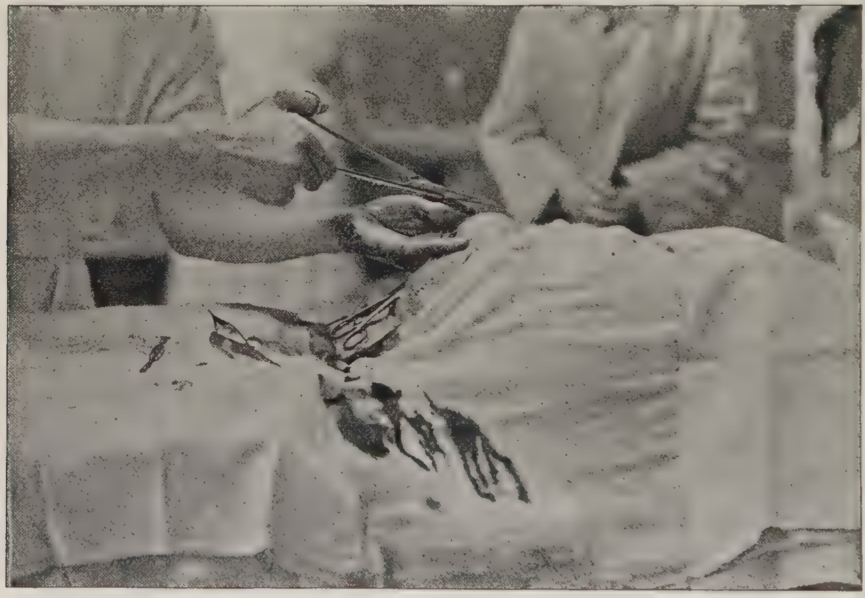
Sterilized towels are used to protect the thighs and chest, and over the whole abdomen, chest and thighs a large piece of gauze, three folds thick, is laid. This is slit open for a short distance in the median line, and through the opening the operation is conducted with a minimum danger of auto-infection from the patient's skin.

For making the incision a sharp scalpel, two pairs of rat-tooth forceps, and one or two short sharp-nosed artery forceps are necessary.

The operator steadies the abdominal wall and holds the skin a little taut, between the thumb and middle finger of the left hand, while the right hand makes a sweeping incision vertically downward in the median line from two to eight inches long, according to the nature of the operation. In doubtful cases a shorter incision should be made first, and afterward lengthened if necessary.

After passing through skin and fat the sheath of one of the recti muscles appears. This white and fibrous layer may be cut a little obliquely, when the incision is almost sure to cross the linea alba, seen between the two red muscles. The incision is continued down between the muscles in the linea with the aid of an assistant, who catches the tissue of one side with his forceps, while the operator does likewise on the opposite side. Thus the tissues are lifted up and drawn apart, layer by layer. The superficial fat, which is of variable thickness, appears next, and beneath this the thin, delicate peritoneum. The peritoneum must be caught very superficially in the forceps and gently incised, so as merely to nick it. The intestines drop back the moment the smallest opening in the peritoneum is made, and then the incision can be boldly enlarged upward and downward to both extremities of the incision. In enlarging the incision the operator should always glance through the peritoneum which is lifted

Fig. 83.



Method of Enlarging the Abdominal Incision.

up by forceps, to assure himself that he is not opening an abnormally high bladder.

The bleeding from the walls of the incision, although stimulated by the massage given in scrubbing the skin just previous to the operation, is usually slight, and ceases spontaneously, as a rule. If too free, one or more vessels may be caught with artery forceps, which can be removed at a later stage of the operation, when the bleeding will have ceased. Occasionally a large spouting artery requires immediate ligation with the finest silk or catgut ligature. If the incision proves too small, it may be quickly enlarged by cutting upward with a pair of scissors rounded on the points, guided by a finger within the abdomen, which protects the viscera from injury.

In making a long incision it is best to cut a little to the left of the umbilicus and then upward to the left of the median line, thus avoiding the suspensory ligament of the liver.

Closure of the Abdominal Incision.

The incision should be closed by two or three rows of sutures; one continuous suture of fine silk uniting the peritoneum, transfixing each side three or four times to the inch. The peritoneal surfaces thus sutured unite rapidly, and shut off the abdominal cavity from contamination by stitch-hole abscesses. Immediately overlying the peritoneum are the recti muscles, and over these, often a little retracted from the margins of the wound, the strong fibrous fasciæ. These may now be approximated by a layer of interrupted, buried sutures, about three to the inch, taking great care to bring together the edges of the fasciæ of the two sides from top to bottom of the wound. This is the most important step in the closure, as in this fascia lies the strength of the abdominal wall, and in its proper reunion lies the protection against a ventral hernia which may arise as a sequel to the operation.

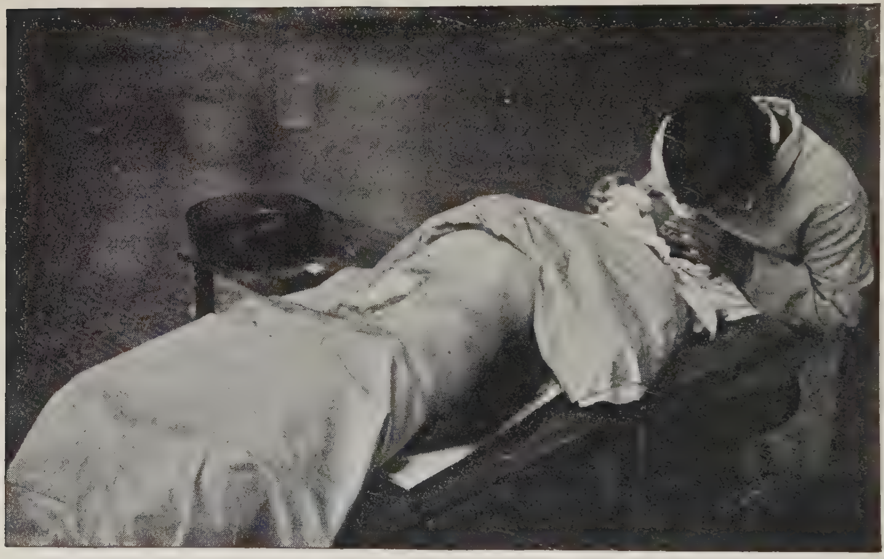
The interrupted sutures should be drawn sufficiently tight to hold the parts snugly together, but never tight enough to constrict the tissues. The sutures should then be cut close to the knot. The approximation of the skin may be secured either by an interrupted silkworm-gut or a continuous fine silk suture, entered below the lower angle of the wound, passing from side to side subcutaneously, and reappearing above the upper angle.

Another simple and satisfactory method of closure where the walls are thin, is, *first*, to apply the continuous peritoneal suture; and, *second*, a series of interrupted silkworm-gut sutures about one-third of an inch apart, each including skin, fascia, and muscles. The gaping skin between these sutures is approximated by superficial sutures of fine silk.

DRESSING THE WOUND.

The skin is dried and a fine powder of boric acid and iodoform (7 to 1) is sprinkled abundantly over the wound; over this a rectangular piece of several layers of gauze is laid, overlapping the incision three or four inches on all sides. The outer edges of this gauze are sealed to the skin with collodion. The centre is left dry to absorb any discharge from the incision.

FIG. 84.



Occlusive Dressing of Abdominal Wound.

The gauze is freely powdered again, preventing the collodion from adhering to the superficial dressing, the abdomen is padded out with sterilized absorbent cotton, a many-tailed bandage is applied and the patient transferred to her bed.

Another simple and effective method of dressing, is, first, to place half a dozen layers of sterilized gauze over the incision, then a pad of absorbent cotton covered with sterilized gauze, large enough to cover the abdomen, and the whole held in place by means of a six-tailed bandage.

MENSTRUATION AND ITS ANOMALIES.

MENSTRUATION.

DEFINITION.—The flow of the menses. A periodic function of the female generative organs, consisting in a bloody discharge from the uterus. It occurs, on the average, every twenty-eight days, and continues from one to six days. Menstruations extend over from thirty to thirty-five years of woman's life, and this time is known as the period of the "genital life."

SYNONYMS.—It is popularly known by the following names or expressions: "being unwell," "periods," "turns," "courses," "flowers," "terms," "sickness," "the reds," "menstrual flux," "troubles," "monthly illness," "the flow," "the catamenia," "the monthly purification."

REGULARITY AND DURATION.—The average time of the reappearance of menstruation, counting from the beginning of one period to that of the succeeding one, is twenty-eight days. This interval is not fixed; it is very elastic. In many cases it is less than twenty-eight days; in others, longer than four weeks, appearing however with punctuality. One woman may menstruate every calendar month or twelve times each year, while another may menstruate sixteen or seventeen times each year, yet both may be normal. Again, a woman may always have irregular intervals between her flowing and yet be perfectly well. A woman in good health, who asserted that her menses always appeared regularly, was directed to keep an accurate record of the intervals for one year. At the end of that time her report showed that they varied from twenty-four to thirty-five days. Being healthy and never having had her attention directed to the matter before, she had always called herself regular. The general rule, however, is that women menstruate every twenty-eight days.

Occasionally the menses appear at very irregular periods—*e. g.* two to five times in one year. One woman, in apparently good health, gave a history of an average of only two menstruations annually for over seventeen years, her flow having no regularity; the two periods sometimes occurred within thirty days, no other menstrual flux appearing till the following year. Such cases are altogether unusual. A few women have been known to menstruate only in warm weather.

A normal menstruation may last from one to six days. Each woman is a rule unto herself in the matter of the duration of her monthly flow. Whatever her experience in this direction may be when she is in an otherwise healthy condition, is normal for her—a condition that cannot necessarily be laid down as the normal one for another woman. Three stages characterize the flow: 1st, the fluid is slimy and odorous, colored light or dark red by a small number of blood-corpuscles in a proportionately large amount of mucus; 2d, the fluid is almost pure blood; 3d, the fluid becomes lighter colored, its constituents being similar to those of the first stage. Exceptionally, the third stage is followed by another flow of pure blood lasting one day, to be followed by a light-colored mucus discharge, lasting thirty-six to forty-eight hours.

Very commonly, in girlhood, the approaching menstruation is heralded for two or three years by certain disorders occurring with monthly periodicity. It is not at all rare at this age to meet with very obstinate symptoms, such as headaches, epileptic fits, digestive disorders, or cutaneous affections, for whose treatment the usual remedies fail. The writer encountered in a girl of fifteen years of age, before the menses had appeared, an attack of facial erysipelas which recurred every twenty-eight days for a period of fourteen months. For such maladies medical men are in the habit of prophesying a cure when menstruation is established—a fact that experience verifies. As the time for the appearance of the flow draws nigh the nervous system becomes more irritable; there is general uneasiness and an alteration of the moral character. Commonly there is much languor, flushing, sensation of fulness, and disturbed or unnatural, heavy sleep, these symptoms continuing for a longer or shorter period. Immediately preceding the first flow there is much pain and weight, with fulness in the head and pelvis, and throbbing and swelling of the mammæ. Often the discharge is not at all regular to the month for the first half year or so, passing over a month or longer; yet the usual prodromic disturbances, enumerated above, are found to observe the lunar intervals quite regularly. In many young women the precursory

PLATE XI.

Fig. 1.

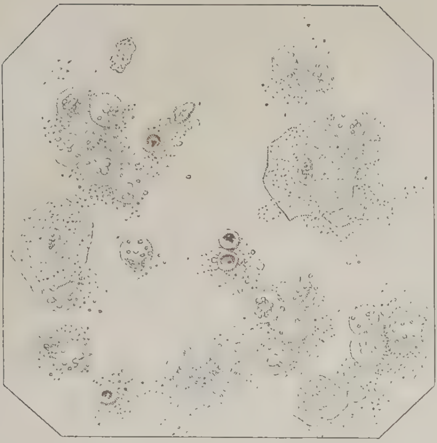


Fig. 2.

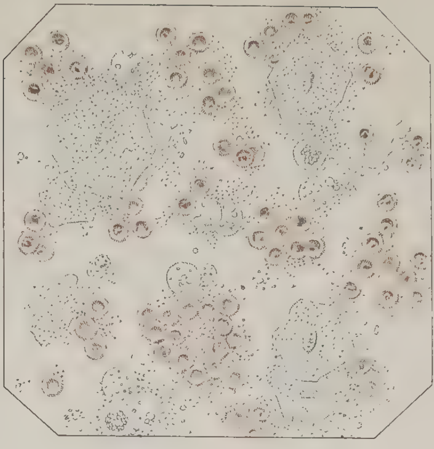


Fig. 3.

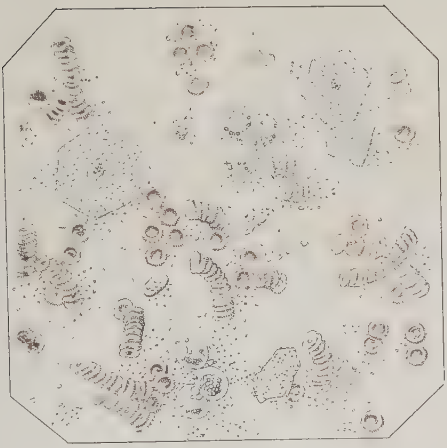


Fig. 4

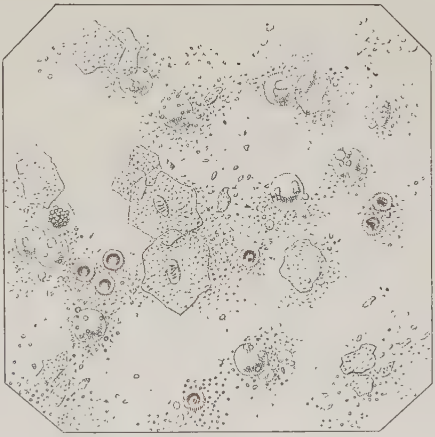


Fig. 5

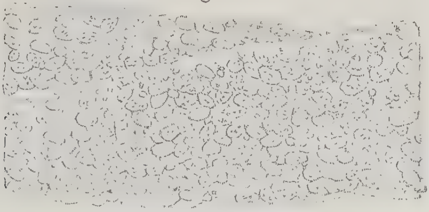


Fig. 6.

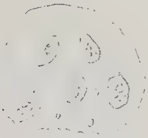
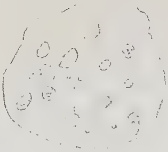


Fig. 7.



Microscopic view of Menstrual Fluid at different periods of Menstruation (Figs. 1, 2, 3, 4). Fragments of Endometrium cast off ten days after Menstruation (Figs. 5, 6, 7).

phenomena above mentioned are so slight or evanescent that no attention is paid to them. Slight choreic movements and an elevation of temperature may accompany the first menstruation.

The menses usually appear in American women at the fourteenth year. The colder the climate the later does menstruation become established. The average time of its appearance in temperate climates has been set at between twelve and eighteen years, from thirteen to twenty-one for cold climates, and from eleven to fifteen for hot climates. City girls menstruate earlier than girls who live in the country. Brunettes are said to menstruate earlier than blondes. Precocious menstruation is often seen at ten, nine, and even as early as eight years of age. Cases of much earlier appearance have been frequently reported. One case is recorded in which the menses appeared within the "first few months after birth" (Charpentier). On the contrary, there are women in whom menstruation is delayed.

Menopause, or Change of Life.

Definition.—The cessation of the menses is called the "menopause." By the term is meant that period in a woman's life when she stops menstruating.

Synonyms.—Its synonyms are the "critical time," the "turn," the "change of life," the "dodging-point," and the "climacteric."

Description.—The menopause includes a very elastic period of time in a woman's life. It may be very brief and abrupt, or it may extend over a long period of time, as three or more years. The typical development of the menopause consists in the irregular occurrence of the menstrual flow. Instead of appearing at the usual time, it will be delayed a few days or will pass over to a second period or longer, and then occur about as usual in the amount of the flow and accompanying symptoms. This menstruation will be followed by similar irregularity, or perhaps by one or more flowings, regular as to the intermenstrual interval and to the amount of the discharge and with the usual accompanying symptoms. This irregularity of the discharge may continue for a period of over one year, or to three, or even five years, when the flow disappears entirely, never to be seen again.

Occasionally it happens that women, menstruating regularly, almost to the day, experience a sudden and complete disappearance of this function. Such an experience in the change of life is altogether exceptional.

The menopause may be said to include all of that period of time, intervening between the beginning irregularity of menstruation and the complete cessation of the flow, with the subsequent restoration of health. At this time the vague nervous symptoms which accompany the disturbances incident to the change of life are ushered in. Where these exist, depending upon the approaching menopause, they must be included in this period. During this space of time, very often, different symptoms are produced by different women.

These symptoms include manifestations or perversions, especially of the nervous system, and are shown in the form of vertigo, faintness, flushes, cold hands and feet; in the digestive system, by gastric fermentative dyspepsia, tympanites, constipation or diarrhea; in the circulatory system, by palpitation, syncope, and vicarious hemorrhages; in the cutaneous system, by sudden, severe and oftentimes offensive sweatings; in the mental realm, by loss of memory, irritability of temper, fear, apprehension, melancholia, and hysteria; by changes in the physique, the development of hair on the chin and face, flaccidity of the breasts, and the great increase of omental and abdominal fat. Very many other symptoms might be mentioned. Pelvic and lumbar pains, such eruptive conditions of the skin as appear at the age of puberty, pruritus vulvæ and colic, are often encountered.

A sallow, chlorotic, or plethoric state, or a nervous condition entirely unusual in the patient, may characterize her at this period. Leucorrhea is one of the most common symptoms during the change of life. An awakening of sexual desire, quite unknown during previous years, which is often looked upon with a sense of shame and degradation by its possessor, is not uncommon in women undergoing the menopause.

It must be distinctly understood that the symptoms enumerated above are not all to be found in every woman at the change of life. They include the principal disturbances observed at this time in a large number of women. The ones most commonly encountered are the manifestations exhibited by the nervous system. The one symptom of all those enumerated that seems to be well-nigh universally experienced at this period, is flushes; few women escape them. Next to them in frequency may be mentioned the disturbances of the alimentary tract.

Some women experience a multitude of these symptoms, while others seem to escape nearly all of them. Their cause would seem to reside in the sudden congestions of certain areas of the nervous system, through the non-escape of the customary monthly bloody discharge. Their relief is often experienced by vicarious hemorrhages from the nasal mucous membranes, from hemorrhoids, by a free diarrhea, or a profuse leucorrhea.

The sudden cessation of the menses is frequently associated with an abrupt invasion of the nervous system, as fright, shock—mental or moral—or by some septic malady, as uterine and tubal disease, the essential fevers, gout, or rheumatism.

The symptoms accompanying artificial menopause following the removal of the uterine appendages are usually more abrupt, lasting in most cases not longer than a year. Consequently, the change is more stormy, all the symptoms being exaggerated.

A stormy, irregular, or delayed menopause should excite in the attending physician the suspicion of some pathological condition. This is the time of a woman's life when malignant disease of the uterus or its appendages is most likely to manifest itself, and usually the first indication that there is any abnormal condition, is seen in the behavior of the establishment of the menopause. When this has once become established, all the tissues being healthy, there should never be a return of the bloody show. Not only should the periodical bleeding cease, but all vaginal discharges become abolished. If uterine bleeding occurs after the establishment of this condition, one of two diseases is most likely to be found—either fibroma or malignancy, with the chances largely in favor of malignancy, especially if the woman be a multipara. In such cases the attending physician should carefully exclude these conditions by physical and microscopical examinations.

The importance of carefully watching a woman through this stage of her life cannot be too emphatically dwelt upon. It is commonly the practice for physicians to attribute all the ills and complaints of such a patient to the menopause. If untoward and unusual symptoms appear, they must be carefully studied and their cause discovered if possible. Whatever pathological condition is found must be dealt with as it would be at any other period of a woman's life.

The time of the cessation varies with the climate, to a certain extent; the colder the climate, the later does the menopause occur.

The average time of the termination of a woman's menstrual life is in her fifth decennium. Variations from this, in recorded instances, extend from the twenty-second to the eighty-second year. Such extremes are altogether exceptional and unusual.

Women who begin early in life to menstruate usually pass the "climacteric" late in life. Those who begin late to menstruate pass the menopause comparatively early. Exceptions to both these statements exist, but they compass the rule in a large range of observations.

Heredity seems not to be free from influence in determining the time of the menopause. As the mother was in this particular, so the daughters are very apt to be. Compliances with this rule are infinitely more numerous than are the exceptions.

PATHOLOGY.—The involutional changes in the pelvic organs at the menopause are precisely the reverse of what is seen at puberty. The vulva becomes flattened and shrivelled through absorption of its subcutaneous fat. The dimensions of the vagina become contracted in every direction, and, in the majority of women, the hourglass contraction is seen at the junction of the middle and upper thirds of this canal. The uterine walls atrophy, the cavity diminishes, and the cervix contracts greatly, sometimes almost disappearing. The Fallopian tubes diminish in size in all dimensions and even become obliterated. The ovaries shrivel and shrink in every diameter, even to the point, apparently, of their complete disappearance. Their envelope becomes wrinkled and folded in, contracting and pinching the walls of the Graafian follicles, which appear as little grayish pouches. The mammary glands shrivel and become greatly flattened in the majority of women.

DIAGNOSIS.—It is an easy matter to make a diagnosis of the menopause. There is one pathognomonic indication of the presence of this condition which is invariably found in all cases. If every disease or condition requiring the skill of a physician had but one symptom as clearly pathognomonic as the climacteric possesses, the practice of medicine would be infinitely easy. In all cases of the change of life this one indication, never absent, is the interruption to the regular and stated appearance of the menstrual flow. This interruption does not always present itself in the same manner. It usually appears in lapses, of greater or lesser degree, in the appearance of the flow. The habit of each woman as to the regularity of her menstruation must be learned, and from that habit comparison instituted. Women often consult their physicians, supposing themselves to be passing through this period of their lives, so much feared, when inquiry reveals the fact that their menstruations are perfectly normal in the date of appearance, the amount of discharge, and the accompanying symptoms. Such patients, irrespective of their age, can always be assured that the much-dreaded period has not yet arrived.

The symptoms of the climacteric are multiform. The principal ones have been enumerated under the description. The test of the pathognomonic value of these symptoms is shown by the relief experienced by a profuse flow after a protracted amenorrhea of several weeks or months. These flows relieve the congestive state which is so productive of perturbed functional conditions. Following them is a cessation of a number of those symptoms that have become gradually established during the period of amenorrhea.

Organic diseases must be carefully excluded in the diagnosis of the menopause. For instance, to attribute a pyrosis and vomiting to the nervous aspect of the change of life, when an incipient gastric carcinoma is present, would be an unfortunate exhibition of diagnostic carelessness. The most careful and painstaking examination should be made in every case. Methodical examination of each organ is demanded. In this way only can organic disease wholly foreign to the climacteric be excluded. Failure to detect incipient pathological developments may result in disaster and death.

Prognosis.—The prognosis is generally good. Where the germs of disease have existed previously, organic disorders may be started into activity and developed at this time. This is perhaps especially true of dysplasmatic growths. It is frequently observed, in highly neurotic women, in whom an hereditary taint of insanity has been previously recognized, that this disorder may develop at this time.

Generally speaking, the prognosis is satisfactory. It is exceptional that the troubles of the menopause are anything more than temporarily active.

Treatment.—The treatment is governed wholly by the indications present, and thus becomes symptomatic.

The axiomatic principle of the treatment of all disorders holds true in the management of the menopause, and that is to make waste and repair as nearly equal as professional skill will permit. This involves a most careful attention to the secretions, the excretions, and the blood state. Women suffering from a deficiency of secretions, a retention of excretions, or from impoverished blood, are sure to present many serious symptoms at the menopause.

The state of the alimentary tract demands particular attention. The fermentative dyspepsias are productive of more symptoms at the change of life than at any other period. Gastric lavations, creasote, salicine, corrosive sublimate, and other antiseptic remedies are indicated. A tender liver and chronic constipation call for daily laxatives. Cascara, compound liquorice powder, Hunyadi salts, Rochelle salts, and other salines are highly useful. The salines are especially indicated when anemia is not too profound, because their depletory action lessens congestion, an effect greatly needed at this period of a woman's life. Daily defecation should be insisted upon. Constipation, producing numberless reflexes and leading to fecal anemia, is a most deplorable condition and should not be tolerated.

The renal system is to be carefully considered. Renal insufficiency must be corrected. Lithemia may be eliminated by the free use of lithic-acid solvents, as the citrate of potassium or lithium. Lithic acid is the parent of many neuralgias and mucous-membrane disorders. Ignoring its presence frequently defeats the physician's treatment.

The cutaneous system should not be ignored. Frequent warm baths are useful. Above all, the skin should be protected from changes of temperature by suitable underwear. Chilling the surface of the body facilitates many minor internal congestions, which can be avoided by proper attention to the clothing. The systematic use of general massage and Turkish baths invites the blood to the skin, tending thus to equalize the circulation and to relieve internal congestions.

The condition of the heart demands attention in many cases. One of the most common complaints is paroxysmal tachycardia, which comes and goes erratically, lasting when present from minutes to days, the intervals of absence varying similarly. The attacks come on without warning, even during sleep, accompanied by violent action of the heart, pulsation of the carotids and aorta, cephalalgia, and flushes. A consuming fear of apoplexy or sudden death prostrates the patient. Her general state becomes demoralized by repetitions of the attack. Sleep is disturbed by horrible dreams, and she becomes the victim of general nervous depression. Occasionally œdema without albuminuria is observed. These attacks generally do not depend upon organic cardiac disease, but upon local congestion of the heart-centre in the medulla oblongata, doubtless a reflex, in the majority of cases, from the alimentary tract. This statement is confirmed by the relief following the use of remedies addressed to the digestive apparatus.

All cases complicated with cardiac symptoms demand a most careful examination of the heart. Severe and long-continued menorrhagia is often associated with feeble heart. A fatty heart, as well as a feeble heart, is attended with impeded circulation, as is shown by œdema, albuminuria, dyspnea, and palpitation. It is a grave error to attribute such symptoms to nervousness or hysteria or to the change of life.

The blood state frequently demands attention. Anemia is often caused by the dyspepsias and constipation. When it arises from hemorrhages, especial attention should be given to the most absolute quietude in bed and to hemostatic measures. Blood-poverty is the cause frequently of the most annoying and obstinate functional disturbances of the nervous system; hence its correction is of the utmost importance. Where plethora exists venesection is in many cases most urgently demanded. Bloodletting is a lost art to-day; where it is inadmissible, saline cathartics can be freely used. Bleeding from the arm or from the cervix uteri gives more speedy and protracted relief than any other measure; it rarely does harm. Leeches can be used over the region of the round ligament at the external abdominal ring, or at the anus, in cases of ovarian or uterine congestion.

Mental therapeutics should not be ignored. The depressing emotions exert a deleterious influence on woman at this period of life. Hence worry, care, anxiety, and unnecessary responsibilities should be cast aside as much as possible. Social diversions, amusements, and congenial occupations ought to be encouraged. Opportunities for depressing introspection should be guarded against sedulously.

The nervous symptoms so common at this time, as flushes, tremblings, headaches, etc., dependent on local congestion of certain areas of the nervous centres, are best relieved by the bromides. These agents decongest and benumb, hence their wonderfully satisfactory action in women passing through the change of life. The effects of these preparations cannot be too highly praised. The choice of a bromide is not altogether inconsequential. The ammonium bromide is very speedy in its action, but it is far too evanescent. The potassium bromide is much slower and more permanent in its effect, but its depressant influence on the heart in large doses is objectionable. All potassium salts in full doses are cardiac depressants. A more pitiable combination than a woman suffering from severe nervous manifestations in the menopause, combined with an induced cardiac debility, is difficult to imagine. The sodium bromide is the best of all bromides to use. It is markedly diuretic and does not materially depress the heart. The tendency of the bromides to produce acne can be largely averted by the use of arsenic, in the form of Fowler's solution, after meals. The effects of the bromides are wonderful in relieving pains, flushes, nervousness, and mild melancholia. Used in combination with camphor, their anaphrodisiac action, where needed, is most gratifying. Too much caution against the miscellaneous use of narcotics and diffusible stimuli cannot be entertained. The use of opium and chloral is especially objectionable, unless the suffering becomes unendurable, when they should be used for the briefest period of time and interdicted by the physician's specific ordering. The objection to their use is the fear of establishing the opium or chloral habit at this impressionable time, when a woman will resort to anything to secure relief, irrespective of consequences.

From the foregoing remarks it will be seen that the object of therapeutic attack must be sought for, chiefly, outside of the pelvic organs. It is understood that uterine, tubal, and ovarian congestions, when found, are to be treated *secundum artem.* The remainder of the treatment of women at the climacteric is purely symptomatic. There is no specific treatment of the menopause.

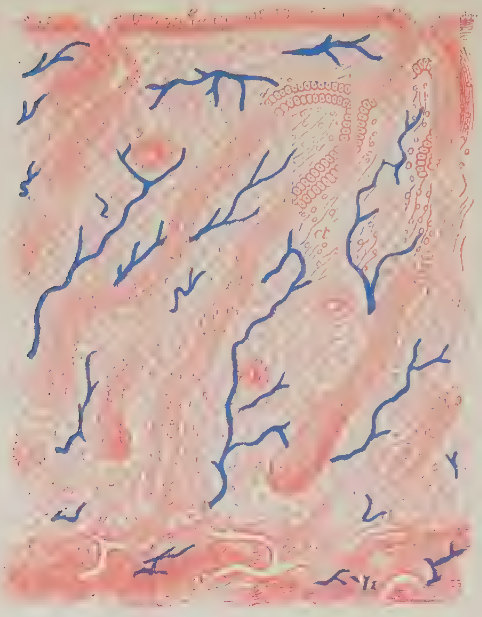
Composition and Quantity of the Menstrual Discharge.—The flow at first is mucous in character, gradually changing color till it becomes distinctively sanguineous. It has an acid reaction from phosphoric and lactic acids; a peculiar odor, due to fatty acids; and consists of blood (venous), serum, ciliated vaginal epithelium, and the débris of an endometrium necrosis, mixed with pigment, broken-down blood-disks, and granular detritus. It is ordinarily non-coagulable, owing to the mucus that it contains. When there is disproportionately too large a quantity of blood present, as in menorrhagia, coagulation is common. Hence, when women flow too freely, as from a diseased condition of the pelvic organs, it is exceedingly common to see coagula discharged; therefore, the attempt to prove that coagula in the menses indicate an abortion is fallacious. At first in normal women the discharge is pale, at the height of the flow, deep red, and toward the last, again pale. In chlorotic women is seen the pale flow, or *menstruatio alba.* It is erroneous to say that the discharge is poisonous, having an injurious effect on living things, as men, animals, and plants. Its mucous element possesses at times an injurious and irritating effect on the male urethra, causing a peculiar chronic urethritis. One can but be impressed by the wisdom of the Mosaic edict forbidding cohabitation with a menstruating woman.

Some women are said to be free from the function of menstruation. Close inquiry, however, usually reveals the fact of a periodic white discharge occurring from their genital organs.

The amount of the discharge varies from four to eight ounces. The recorded observations of extremes vary from two to eighteen ounces. Many conditions cause variations in the amount in the same women, as health, diet, exercise, climate, and sexual excesses: consequently there is nothing fixed. Hippocrates thought the Grecian women shed twenty ounces at each period. Galen averred that the Romans lost eighteen ounces. Meigs stated fifty years ago that many healthy American women lose twenty-one ounces as the normal and regular elimination. Such amounts must be regarded as far above the average.

The source of the menstrual discharge is the endometrium. It is the consequence of hyperemia of the pelvic organs: the uterus, tubes, ovaries, and broad ligaments. The contraction of the muscular fibres of these organs compresses the veins, retarding the flow of blood and increasing the tension in the capillaries, which rupture and give rise to the appearance of the menstrual flow. Under the influence of this congestion, the volume of the uterus increases a quarter, a third, and sometimes more. At this time the pampiniform plexus becomes so distended that in lean women it can very often be detected by conjoined manipulation. The turgid uterus undergoes a true anorthosis. The cervix becomes larger and softer. The endometrium swells, becoming folded and mammillated. The epithelia become loosened and pushed off. The hypertrophied mucous glands become the seat of an abundant secretion. The lining membrane of the fundus yields the largest part of the catamenial discharge, because of its looser anatomical texture, while the cervical canal, having more resisting vessels, which do not burst,

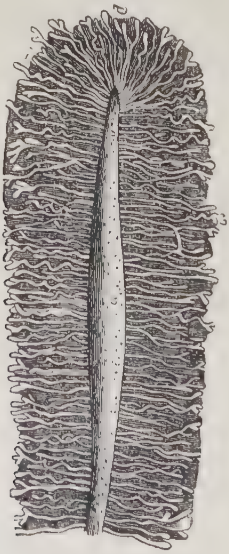
FIG. 85.



Vertical Section through Normal Mucous Membrane of the Uterus: *e*, columnar epithelium, the cilia not represented; *gg*, utricular glands; *ct*, *ct*, connective tissue; *vv*, blood-vessels; *mm*, muscularis mucosæ.

yields a purely mucous discharge. The canals of the tubes are sometimes filled with blood likewise, thus increasing the menstrual flow. The vagina becomes darker in color and the increased vascularity causes the mucous membrane to swell and to shed an increased

FIG. 86.



Menstrual Endometrium.

amount of mucus, having more or less odor. The vulva often becomes tumefied, and is sometimes the seat of mild pruritus, thus explaining the frequently experienced micturition.

The menstrual discharge, composed of blood, mucus, serum, epithelia, and the débris of granular detritus, is a very complex fluid. The endometrium, undergoing rapid degeneration, is shed in patches and shreds. It is called the *decidua menstrualis.* This decidua is developed from the upper part of the uterine mucous membrane, and does not involve the Fallopian tubes or cervix uteri. The shedding and the redevelopment of this decidua are matters involving much speculation. It is generally conceded at present that it is cast off in fragments—sometimes in one or two large pieces. Within a few days it is re-formed, and its shedding again repeated. Should conception occur, the *decidua menstrualis* becomes the *decidua vera.* The *decidua menstrualis* is a very important factor in membranous dysmenorrhea.

The *syndroma menstrualis* includes the attendant phenomena of a menstruation, preceding and accompanying it. They are both general and local.

General.—The entire glandular system is stimulated. The sudoriparous glands secrete increasedly, and in many women the odor of the perspiration becomes characteristically pungent. The bronchial glands secrete more actively. The alimentary secretions are increased in many women to such a degree that they are inclined to eat voraciously, while many other women have diarrhea at the outset of the menstrual flow. Pigmentary deposit under the eyes and on the nipples, genitals, face, and neck is common. An increased deposit of fat beneath the skin in most parts of the body very commonly accompanies the establishment of the genital life of woman, and all the contours become more rounded and graceful. The volume of blood is augmented and cardiac action and arterial tension are increased. Malaise and lassitude supervene. Many girls experience a nervousness bordering upon uncontrollability. Alternate subjective sensations of heat and cold are often experienced.

Local.—The vulva becomes more prominent and filled out. The uterus and vagina enlarge. Pubic and axillary hair appear. The mammary glands increase in size and become sensitive, the nipples grow larger and darker. The pelvis becomes broader. The mental changes exhibit the occurrence of sexual desires, by the development of more reserve and the abandonment of hoydenish ways. Increased micturitions, yawnings, cramps, and hiccough are common. Hemorrhages occurring at the same time from other parts are known as supplemental menstruation. Piles, if they exist, are more congested and nævi are deeper colored.

Vicarious or *ectopic menstruation*, or *xenomenia*, consists of a bloody discharge from some other organ than the uterus, either with or without a minimum menstrual flow at the same time. When the minimum menstrual discharge occurs, vicarious or supplementary menses takes place from the lungs, the nose, the alimentary canal, or the subcutaneous cellular tissue. Where there is no uterine hemorrhage, the vicarious menstruation may arise from the lungs, nose, alimentary canal, mouth, the surface of a sore, from an erectile tumor, the skin, the conjunctiva, the nipples, the gums, the bladder, the ear, or the stump of an ovarian cyst. The nose is the most frequent seat of vicarious menstruation. In menstrual hemoptysis it is of vast importance to exclude tuberculosis. Occurring from the skin, vicarious menstruation is called "hematidrosis" or "sweating blood."

Retention of menses, or *hematometra*, is an accumulation of the menstrual flow within the uterus, its exit being prevented by a defect of formation of the uterus, cervix, vagina, or vulva. Such cases may be denominated apparent amenorrhea. At first they are regarded as amenorrhea. Much pain characterizes them, and they may be regarded as practically to occupy a place between amenorrhea and dysmenorrhea. Every month the patient presents painful disturbance centering in the hypogastrium. Cephalalgia may occur, with flushing, accelerated pulse, emesis, intestinal and vesical disturbance, and leg pains. In a few days these phenomena subside, only to reappear in about twenty-eight days. The general health at length deteriorates. Sooner or later the abdomen swells. A mild degree of sepsis may occur, commonly hastening to a climax. Soon thereafter the physician is called to investigate, and an atresia is discovered.

Cases of *uterus bicornis* have been reported where one cornu was patulous while an atresia of the other existed, causing a retention of the menses. Decés reported such a case in 1854 wherein rupture and a fatal peritonitis occurred.

Cases of retention may be congenital or acquired. In the former there is some congenital defect or some condition acquired in childhood. In the latter the atresia most commonly follows parturition or syphilitic invasion.

The intermenstrual molimen consists of the presence, in some women, of all the discomforts of a menstruation without a bloody discharge, occurring midway between two monthly periods. Many women experience it in full intensity, while others have it in only a slight degree. Oftentimes therapeutic measures are necessary to control these intervening pains.

Menstruation and Ovulation.—Till within a few years these two functions were considered as one, the flow being regarded as the external manifestation of ovulation. At present this view is opposed by many writers. Formerly no one felt disposed to question the accepted theory that the ovaries controlled menstruation. After the removal of the ovaries became a common operation, it was found that nearly all women undergoing this procedure ceased menstruating, and then the conclusion was confirmed that the ovaries presided over the function of menstruation. Later it was observed that occasionally a woman was found who continued to menstruate after oöphorectomy. This led to questionings which threatened to uproot the time-honored theory of the interdependence of menstruation and ovulation. Very soon thereafter one prominent laparotomist boldly announced his belief that the Fallopian tubes controlled the function of menstruation, his argument being, that when the ovaries and tubes were completely removed, menstruation never appeared thereafter. He thus explained that menstruation after oöphorectomy occurred because not all of the tubes was removed. In time it was found that even after the removal of ovaries and tubes cases of menstruation or of monthly flow were occasionally reported; hence the true explanation of the cause of menstruation seemed not to have been supplied. Further speculation followed. The latest theory of causation advanced, is, that neither the ovaries nor the tubes control menstruation. Instead, it is the tubo-uterine plexus of sympathetic nerves which causes the appearance of the menses. Removal of the ovaries does not always annihilate the integrity of this plexus, nor does every case of removal of the tubes; therefore where this plexus remains uninjured the monthly flow will continue to appear. Speculation on this much-mooted question is still rife. The following statements may be accepted as the status of professional opinion on this subject at this time: 1. That ovulation and menstruation are closely associated, but not necessarily interdependent; 2. That ovulation may occur without menstruation; 3. That conception very often occurs without menstruation.

Pertinent to the last statement may be mentioned the fact that many women go for years without menstruating, while they are bearing children in rapid succession and suckling them. One case, reported in 1879, showed that a peasant-woman married before menstruation began, became pregnant and bore and suckled sixteen children in the succeeding twenty-one years, when, at the age of thirty-six, she menstruated for the first time. Afterward in her widowhood she menstruated regularly. It is claimed that ova are developed in the earliest infancy, during lactation, and even after the menopause. Evidence has repeatedly been adduced, in reported cases, of ovulation occurring during pregnancy. Facts such as these supply irrefragable evidence that ovulation occurs without producing menstruation. The final settlement of the relation existing between menstruation and ovulation is still waiting unassailable demonstration.

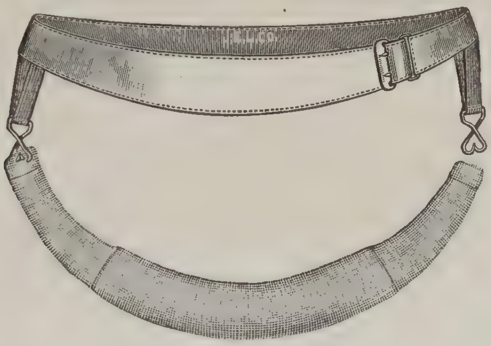
Menstruation during Pregnancy.—When a woman is pregnant her menstruation does not appear; that is a rule, to which, however, there are exceptions. The exceptions are atypical: some women menstruate once after conception, some twice, and others oftener. Whether the flux is a pure and simple menstrual flow has perhaps been questioned, but the fact is indisputable that it has appeared promptly on time and has acted just like a genuine menstrual flow. Such discharges of blood have been called "accidental hemorrhages," and not the typical bloody flow of menstruaation. The writer recalls a woman whom he has attended in five out of her six confinements, in whom the calculation of the time of her delivery was always computed from the date of quickening, it being impossible to determine when conception occurred, because she always had her monthly flow up to the fifth month of gestation.

The *decidua vera* and the *decidua reflexa* do not coalesce and occupy the entire uterine cavity till the end of the third month of gestation. Till that time it is easily understood whence arises the flow—namely, from the uninvaded endometrium. After the third month, however, the menstrual flow must arise from the cervical canal, and it will be small in quantity—a fact which comports with observations. These remarks in no way apply to cases of bloody flow in pregnant women who have uterine cancer, an inflammatory or congested cervix, a polypus or cardiac disease, nor to cases of extra-uterine pregnancy. Cases are related in which patients habitually menstruate only when pregnant. That a woman can menstruate and ovulate after fecundation is shown by superfetation.

Management of Menstruating Women.

Physicians should instruct mothers to secure rest and quietude for the girl entering on her menstrual experience. Ignorance of this function on the part of the girl is highly culpable in the mother. Many a young woman has injured herself irreparably by attempts at concealing her flow, supposing it to be something disgraceful. Thus, washing in cold water, in brooks and streams, has been done to conceal a supposably shameful condition.

Fig. 87.



Menstrual Pad.

Where it is practicable the young woman should remain in bed two or three days or longer during her menstruation. She is the better for such enforced quietude and freedom from the usual wear and tear of her nervous energy, incident to active youthfulness, at a time when her system is learning to accommodate itself to a new experience. Books, magazines, and pictures can entertain her during these days of restraint. She becomes accustomed to the monthly quietude and accepts it without a murmur. Every woman is better off for such resting, and it should, whenever possible, be secured for girls, during the first year, at least, of their menstrual life. Where it is impracticable, her duties should be rendered as light as possible, and everything in the way of severe exertion should be avoided. It is, unfortunately, only too often the case that no rest nor lessening of arduous duties can be secured to young women. Such women grow old too soon.

AMENORRHEA.

DEFINITION.—Amenorrhea is the absence of the menses in adult women who are not pregnant, have not passed the menopause, or do not suffer from retention of the menstrual flow. It is not, *per se*, a disease. It results from a variety of causes which may affect either the system at large, or the genital organs in particular. Thus we may have amenorrhea resulting from general as well as from local causes.

Complete amenorrhea is the total absence of menstruation, whereas *comparative amenorrhea* is that condition in which the menstruation appears only occasionally. *Primary* or *permanent* amenorrhea is the expression used to describe cases wherein menstruation has never occurred. *Secondary*, *transitory* or *accidental* amenorrhea has been called *suppressio mensium.*

CAUSES.—To simplify the causation of all amenorrheas the etiology may be reduced to the following:

Normal menstruation requires the following conditions:

1. A normal condition of the nervous system;
2. A normal state of the blood-supply;
3. Integrity of the entire genital apparatus.

With these three conditions in existence a woman will menstruate normally and regularly. Serious interference with one or more of them will produce amenorrhea.

The nervous system presides over all functions of the body. When it is disordered seriously, the functions are in turn seriously disordered. Menstruation must be regarded as a reflex act. Any break or interference in the cycle of the reflex movement may suspend the menstrual flow entirely. Hence amenorrhea may arise through defects in the nervous system.

It is almost unnecessary to state that there must be enough good blood present in the system before a woman can menstruate normally. Its absence is one of the most prolific causes of the cessation of the flow.

That the entire genital system must be in a normal condition to permit menstruation is self-evident. The organs must all be present, free from stenoses and from degenerative structural changes. In enumerating the following causes of amenorrhea it will readily be observed that each bears upon one or more of the three conditions. Therefore, bearing them in mind will enable the student and practitioner to arrange the various causes systematically and in order. The popular idea that amenorrhea is productive of dangerous constitutional conditions, as consumption, dropsy, chlorosis, nervous prostration, and the like, will be clearly understood to be a reversal of cause and effect.

Whatever seriously affects the general nutrition may stop the menses temporarily. Thus, an attack of typhoid fever or any other serious disease may cause amenorrhea for several months. Through such illnesses the function of hematosis is impaired, preventing the general nutrition of the system. Thus the nervous system with its infinite reflexes fails to perform all of its functions. Menstruation, doubtless a reflex, shares the neglect whenever the general nervous system is not well nourished. The diseases that most frequently cause amenorrhea are chlorosis and pulmonary tuberculosis. It is produced by the anemia that follows the essential fevers, pneumonia, Bright's disease, diabetes, morphinism, cancerous or malarial cachexia, alcoholism, hydrargyrism, acute or chronic surgical affections, and the onset of profound syphilitic invasion.

Extreme mental emotion, as fright, grief, anxiety, or great anger, may suspend the function of menstruation. Women anxious, from misconduct, to menstruate, will often fail to do so. Conversely, cases of cure by some sudden emotion have been recorded. Prisoners and insane women are often victims. *Hysteria gravior* is frequently characterized by the cessation of the menses. The emotional amenorrhea of the newly-married is well known. The anxiety of the woman intensely desirous to become a mother will cause a cessation of the menses, often accompanied by tympanites.

Pelvic disorders may cause amenorrhea, as: imperfect or rudimentary development; absence of the ovaries or uterus; cystic ovarian degeneration; pelvic peritonitis with its resultant adhesions, deforming and displacing the general aspect and position of the pelvic organs; acute metritis and endometritis, chronic diseases of the uterine parenchyma and parametrium, and hyperinvolution of the uterus following pregnancy.

Girls who, during the period of active development of the generative organs, are urged on in intellectual studies without a sufficiency of active exercise, fresh air and good healthy hygienic surroundings, very commonly suffer from amenorrhea. The *vis nervosa* necessary to physical development is perverted and expended in mental work, resulting in delayed or imperfectly developed generative organs. Being the last developed, these organs are the first to fail in fulfilling their function.

Great changes in the mode of living often develop this condition. Thus, nurses in training-schools at times cease to menstruate for a period of two to six months after entering upon their new mode of life. There is often a suppression of menstruation following a sea-voyage.

Rapidly increasing obesity with its resultant anemia, insufficient exercise, and luxurious living, are all well-recognized causes of comparative amenorrhea.

One of the commonest causes of acute amenorrhea is exposure to cold during a menstrual period; cold bathing, sitting or lying in currents of cold air, sitting on cold stone steps, and a change of linen, are common modes of such exposure.

Traumatic injuries can also cause this condition. Nearly every physician of experience can recall some case of amenorrhea caused by a blow or injury.

Renal insufficiency is often a cause. Embryologically, the urinary and the generative organs arise from the mesoblast in the ovum. It is an easy matter to understand that interruption to the physiological action of one set of these fundamental organs may lead to the interruption of that of the other. The logical sequence of cause and effect, herein, may be assailed, but the therapeutic proof is brilliant and incontestable. The writer has repeatedly seen cases of comparative amenorrhea, with no other discernible cause than renal insufficiency, corrected by the use of stimulating diuretics.

Diagnosis.—All cases of amenorrhea must be carefully examined, even under complete anesthesia.

First, it should be definitely settled whether the case is primary or secondary. Primary amenorrhea, where menstruation has never occurred, at once leads to questioning whether the uterus, tubes, and ovaries be present in their entirety. If present, it becomes necessary to ascertain whether an atresia of the cervical canal, vagina, or vulva exists. If the prodromic symptoms of a menstruation have never been present, the suspicion of the absence of one or more of the generative organs will strongly obtain. If these prodromic symptoms have been present, repeatedly, at lunar intervals, with no succeeding menstrual flow, the suspicion is at once excited that an atresia exists, and that the menstrual flow is retained within the genital passages.

If the case be one of secondary amenorrhea, the cause must be sought for both within and without the pelvis, Primarily, pregnancy and lactation must be excluded. Within the pelvis there may exist hyperinvolution of the uterus following pregnancy—*i. e.* a senile uterus. Acute metritis, acute endometritis, or an intense chronic metritis may be found. There may be atrophy or cystic degeneration of both ovaries. Pelvic peritonitis may be present. Either one or more of these pelvic maladies may cause an amenorrhea, although the reverse usually obtains in the inflammatory conditions.

Without the pelvis will be found the larger proportion of causes of the cessation of the menses. Interferences with hematosis through disease and perversions of digestion and nutrition, are the commonest of all causes of secondary amenorrhea. A careful and minute inquiry as to the anamnesis of this condition will lead to the particular line of approach of the causal anemia. This inquiry should be particular, systematic, and exhaustive, because without it the practitioner will only too frequently fail to learn the cause, and consequently to institute the proper treatment.

After securing the completest possible case-history, confirmation thereof will be afforded by a thorough physical examination. Sometimes such an examination will reveal an organic valvular heart lesion, to the astonishment of the physician. If the investigations are carried no further the treatment will *not* include a slowly-advancing Bright's disease, for example, which has led to the cardiac lesion, and the physician will fail in restoring the menses as, perhaps, have other practitioners in the same case. Such physical examination should include *the entire system;* especially the thorax and abdomen. Only the superficial observer will confine his examination to the pelvis. It is surprising to note how often a hydrothorax or a tuberculous kidney will be found as causative factors in amenorrhea. The urine should always be analyzed. The systematic examiner of his gynecological cases will be astonished at the discoveries oftentimes in his patients—discoveries that have so easily eluded former medical attendants—discoveries that shed an entirely new light in the way of cause and effect.

The PROGNOSIS depends entirely upon the cause. Amenorrhea from the absence of pelvic organs is incurable. Pulmonary tuberculosis and other incurable disorders, as advanced Bright's disease or diabetes, present a gloomy prognosis. In cases of hyperinvolution of the uterus the prognosis is unfavorable. Pelvic inflammations, amenable to treatment, afford a more promising prognosis. In short, only where the cause can be removed is there reasonable hope of restoring the menstrual flow.

Treatment.—It must be borne in mind that many cases of amenorrhea exist without producing any kind of disturbance of health. The absence of menstruation is simply a part of a constitutional state. There is no local treatment that will re-establish this function. In patients rapidly progressing along the way of recovery through general treatment, local treatment will often be followed by the restoration of the menses, but this is not *post hoc, propter hoc.* The uterus can easily be made to bleed, but this must not be confounded with menstruation. In truth, we cannot predict positively in any given case of amenorrhea that our treatment will restore the menses.

Our patient must be regarded as an entity possessed of a multiplicity of organs, and any and all treatment must include their functions and interdependence. The moment the physician loses sight of this general fact, his treatment becomes the merest empiricism. The fact ought not to be ignored that a remedy given to a woman progressively improving under general treatment, and who is about to menstruate, will unjustly be pronounced an effective emmenagogue when in reality it had nothing whatever to do with the restoration of the menses. It is incontestable that many drugs have thus been endowed with a virtue never possessed.

The cause always determines the treatment. When pregnancy exists, no treatment is to be instituted. Upon this point the practitioner must ever be on his guard. Designing women often consult the physician for amenorrhea when they know that they are pregnant, hoping that something will be done "to bring on their courses" and thus interrupt the gestation. In all cases when in doubt the physician should either decline to give local examinations and treatments, or simple tonics may be administered with the instruction that the patient return in a month. The patient, seeing the object of her desire so far removed, will not call again.

The necessary anamnesis obtained and examination having been made, the point of therapeutic attack will, as a rule, have been exposed. Cases amenable to treatment should be treated ever and always with the one fundamental object in view—viz., to restore the normal physiological balance, and to render waste and repair equal. To this end it is necessary to restore functions where needed; to increase the activity of the skin, kidneys, bowels, liver; to augment the volume of the blood with hematic remedies; to improve and invigorate the energy of the general circulation by out-door exposure and exercise; to secure the needed daily regeneration of the nervous power by sufficient sleep, and to protect from undue exposure an already enfeebled system by a sufficiency of simple and sensible clothing. A gynecologist doing this sort of work invades the wide domain of the general practitioner.

A daily laxative, like the extract of cascara sagrada, or the compound liquorice powder, at bed-time, and a tonic after meals, as the elixir of iron, quinine, strychnia, and phosphorus, or arsenic, or the mineral acids, will be required in the majority of cases. If renal insufficiency exists, a stimulating diuretic must be added to the laxative and tonic. A good diuretic is the combination of the potassium acetate with digitalis, or a quarter of a grain of calomel, before meals, and the effervescing granular salts of lithia citrate or carbonate, after meals.

With the reconstruction of the general health the menses will usually return where no organic perversion or defect remains.

From time immemorial remedies have been vaunted for restoring the menses. To-day, with an improved knowledge of the pathology of amenorrhea, the number of emmenagogue remedies has become greatly diminished. Iron, manganese, and electricity enjoy the largest amount of favor as possessors of emmenagogue properties. Ergot, rue, savine, and the essential oils are now rarely used to restore the menstrual flow.

The use of iron has been mentioned. The binoxide or lactate of manganese or the permanganate of postassium, in one-grain doses, three or four times daily after food, has found favor as an emmenagogue; it is alleged to determine an increased flow of blood to the pelvic organs. Santonine, in ten-grain doses at bed-time, has been used with success in chlorotic subjects where manganese has failed.

Electricity has been used to restore the menses by a number of gynecologists in the past decade. Its successes and failures do not yield the most unqualified enthusiasm in its use. Faradism may give gratifying results. Static electricity is commended in chloro-anemic girls. The continuous current is used with the positive pole over the lumbar or iliac regions and the negative pole in the uterine cavity. Thus applied, it often produces an uterine hemorrhage, which is not always a true menstruation. In cases where the uterine changes, leading up to a menstrual flow, are present without apparently sufficient menstrual energy to eventuate in a normal periodical discharge of blood, electricity will undoubtedly precipitate the desired result. Unable to determine positively the presence of such uterine changes in a given case, the use of this agent must be more or less empirical.

Galvanic intra-uterine stem pessaries are oftentimes efficacious in relieving amenorrhea: they consist of alternate beads of zinc and copper arranged on a stem.

Intra-uterine stem pessaries have been successfully employed in restoring the menses. The mechanical irritation and cervical dilatation have doubtless contributed to impel more blood to the uterus and its adnexa.

Guaiacum has been strongly recommended in amenorrhea in subjects of marked rheumatic diathesis. The well-known action of capillary stimulation by this drug doubtless accounts for its efficacy in restoring the flow.

The allegation has been made that, as strychnia favors muscular contractility, and thus can aid in rupturing the Graafian vesicles most advanced toward maturity, it favors ovulation. Its use as an emmenagogue in amenorrhea has been favorably reported.

Sodium salicylate has been successfully employed because of its power to produce pelvic congestion.

Oxalic acid, in half-grain doses three or four times a day, has been highly recommended and is very effective. It has been known to bring about a miscarriage when accidentally given during pregnancy.

Indigo has recently been very highly recommended in the treatment of this condition. It cured 13 out of 14 cases; the fourteenth was a failure because it was a case of pregnancy. Under its use the os uteri becomes soft and patulous, admitting the index finger.

The latest advocated method of treatment of amenorrhea is by psychotherapy. Every month brings reports of cures by hypnotism. These cures are obtained by the induction of the hypnotic state and subsequent suggestion. It is alleged that results truly marvellous have been obtained with the expectant attention induced by suggestion. In the present chaotic condition of the entire subject of psychotherapy, the writer is content with barely calling attention to hypnotism in this connection.

Marriage has been recommended as a suitable stimulant in some cases of amenorrhea. In view of the fact that we have no positive data upon which to base a prognostic success, such advice is questionable; its failure would entail mental misery to both parties to the marriage. Whenever we are consulted in regard to the marriage of an amenorrheic woman, a thorough pelvic examination is imperative. Should such a woman marry upon medical advice without an examination, she may discover, when too late, that she is unfortunately deformed, by the lack of a normal development of the generative organs. Such an eventuation has led to more than one tragic termination. It has also caused tribunals to declare nullity of marriage on the ground of error as to the sex of one of the parties.

Amenorrhea is merely a symptom of some general disease, except in those rare cases of malformation, and as such, requires no local treatment, nor general treatment directed solely to the pelvic organs. In the vast majority of cases it causes no trouble whatever, the patient applying for treatment simply for the reason that the usual flow has failed to appear. The mere absence of the menses should be ignored, especially when no other symptoms arise.

MENORRHAGIA AND METRORRHAGIA.

DEFINITION.—The first of these two words is used to express an excessive menstruation; the second, for a flow of blood not only at the menstrual time, but between menstruations. Neither condition is a disease; both are symptoms of some well-defined pathological condition. The latter may be profuse or moderate. The patient who menstruates too freely is said to have menorrhagia, while one who sheds blood between the menstrual periods is said to have metrorrhagia. Women differ in the amount of the normal flow. What would be normal flow in one woman would be hemorrhage in another; accordingly, whatever the amount of flow a woman may have in health, during the first few years of her menstrual life, may be regarded as normal for her. In this particular each woman is a rule unto herself.

FREQUENCY.—Both of these conditions are commonly met with. They may arise from many varying conditions. Any reliable attempt at the expression of the percentage of women who have menorrhagia or metrorrhagia cannot be made.

CAUSES.—The numerous conditions causing too great a discharge of blood from the uterus demand most careful inquiry for their rational treatment. Each case of hemorrhage should be investigated independently for its cause. Indeed, all successful treatment will depend upon the finding of the cause. Frequently the same cause produces the two conditions. When the cause is an aggravated one it may occasion the continuous discharge of blood—metrorrhagia; during its process of disappearance, under treatment, it will be found that the metrorrhagia may be converted into menorrhagia, and that, in turn, may give way to the normal menstruation when the cause is entirely removed. It will thus be seen that it is a particularly difficult matter to differentiate between the causes of menorrhagia and metrorrhagia.

All causes of uterine hemorrhage may be classed under two heads, general and local.

The *general* causes involve general conditions, and are the following: purpura, plumbism, severe icterus, scorbutus, Bright's disease, the spanemia of obesity, phosphorus-poisoning, malarial poisoning, the early stages of tubercular invasion, cardiac disease, and oftentimes, plethora. Hemorrhage may occur in the progress of an acute fever. In the majority of the above-named general causes, the plasticity of the blood is so diminished that clot-formation is seriously impaired, and for that reason the loss of blood continues indefinitely. Such patients very often have periods of amenorrhea of indefinite duration, alternating with hemorrhages.

The *local* causes may be reflex or direct. In the former category actual disease may exist or be absent. Among these cases may be classed the hemorrhages incident to puberty and the menopause, to the first intercourse, to lactation, and to any powerful emotion. The direct causes of all menorrhagias and metrorrhagias are the ones that demand our attention in the vast majority of all hemorrhages. They include nearly every disease of the uterus and its appendages, as metritis, endometritis, subinvolution, granular cervix, retained secundines, retro-displacements of the uterus, fibroids, cancer, polypi, pressure outside of the endometrium, as from fibroid tumors and fecal accumulations, ovarian tumors, chronic ovaritis, chronic salpingitis, hematocele, and acute pelvic inflammation.

Attention is called to another form of hemorrhage from the uterus, occasionally seen, where pregnant women shed blood from the second to the sixth month without miscarrying, and apparently without endangering the life of the child. Speculum examination carefully made fails to reveal the cause. The gestation is not necessarily interrupted, especially under the conservative treatment, if prolonged rest and quietude and the careful abstinence from too active curative measures be observed. Women who have an habitual flow at what would be the menstrual period if they were not pregnant are not included in this class. The hemorrhage comes on at any time, and persists indefinitely, from a day to weeks, without interruption, apparently uninfluenced by anything that can be done.

Pathology.—From the conditions enumerated above it will be seen that whatever condition indicates too free a flow of blood to the uterus may become the cause of hemorrhage. Any one of these conditions existing alone may produce the flow; with several coexisting conditions the flow is still more certain to appear. Occasionally violent hemorrhage will be witnessed from the uterus, when a careful examination will fail to classify the cause.

Prognosis.—If the cause can be found and removed, the prognosis is good. If the cause cannot be found, the treatment must be symptomatic and the prognosis uncertain. If the cause can be ascertained, but cannot be removed, its natural history will determine the prognosis.

Many conditions result from these hemorrhages. We thus have general anemia, sterility, extreme emaciation, neurasthenia, wrecking of the health, and occasionally, death.

Treatment.—The treatment of uterine hemorrhage is determined by the cause. It is not always possible to determine the cause; then it is necessary to treat the hemorrhage empirically. The treatment of cases when the causes are known will be taken up in order.

When the causes are general, general treatment is required without interruption between the hemorrhages. For the treatment of these general causes the reader is referred to a work on general practice; therefore no attempt will be made to direct their management.

When a well-defined local cause is discovered, its treatment should be outlined according to the directions given for treatment in the appropriate article elsewhere in this volume. Thus the treatment of metritis, subinvolution, cancer, chronic salpingitis, retained secundines, and fungosities of the endometrium will be found fully described under the appropriate headings.

For the emergency of hemorrhage the number of remedies recommended in the past is very large. First of all, the patient should be put to bed, and compelled to remain in the horizontal position, with the hips and lower extremities elevated. The more severe the hemorrhage the more imperative is this measure. It will oftentimes be found that a hemorrhage nearly stopped will be brought back in all its fury upon the patient's arising from the bed to answer, for instance, the calls of nature. Cold applied to the lumbar and sacral regions contributes to diminish and check hemorrhages. In very severe cases of uterine hemorrhage, cording the arms and legs close to the body will be found of service: by this means large volumes of blood will be kept in the extremities for a sufficient length of time to permit clotting of the blood in the openings of the blood-vessels within the uterus.

Of remedies used internally, the following may be mentioned: ergot, in twenty-drop doses, frequently repeated by the stomach, or in drachm- or two-drachm doses, with a drachm of deodorized tincture of opium, by the rectum; ergotin given in pill form, or cannabis indica, given to the point of producing mild hallucinations.

Various vegetable astringents containing tannic and gallic acid as their base, as catechu, kino, and hematoxylon, have been recommended.

The mineral astringents, like alum, iron, and lead, have also been used.

In the moderate, persistent, erratic hemorrhages occasionally observed in parturient patients, digitalis is perhaps the best remedy that can be suggested. It operates by increasing the arterial tension, thus diminishing the amount of blood going to the part suffering the hemorrhage. Ergot in such cases is to be avoided for fear of interrupting the pregnancy. Hydrastis canadensis, quinine, hamamelis, strychnine, and especially atropia, are remedies that have been used to control hemorrhage in the non-pregnant uterus. Atropia is administered in doses of $\frac{1}{100}$ of a grain three times daily for several days, or in smaller doses if the patient be very susceptible to the drug. These drugs are all alleged to exercise an influence upon the uterine muscles. Oil of erigeron and oil of cinnamon are at times effective where other remedies fail.

Mineral acids have been recommended. The dilute sulphuric acid is the safest and best.

Treatment between Periods.—Women anemic from hemorrhage must be treated with tonics, protected from fatigue, and placed in the best general hygienic conditions regarding rest, fresh air, and sleep. Due attention should be paid to the secretions and excretions. The marital relations are to be avoided.

In very severe cases of hemorrhage, where the action of medicines cannot be awaited, immediate resort to mechanical measures is imperative. Accordingly, one or more sponge tents should be inserted in the os uteri, and a firm tampon of iodoform gauze placed beneath. In such cases immediate and urgent attention to the general condition of the patient is demanded as to food, stimulants, and absolute quietude. The tents and the packing should be removed within twenty-four or forty-eight hours, during which time some anti-hemorrhagic remedy must be used.

Objection is made in many quarters to the use of sponge tents for fear of producing sepsis. But in the sponge tents of to-day, impregnated with carbolic acid or other antiseptics and impermeably covered with gelatin, we have an agent superior to the iodoform gauze recommended for intra-uterine packing. The tents are aseptic and constitute a much more reliable barrier to the escape of blood from the os uteri. However, tamponing the endometrium with iodoform gauze is very often efficient in these cases. Occasionally, in especially spanemic patients, an oozing hemorrhage will continue through the iodoform-gauze tampon—a thing that is not likely to occur when sponge tents are used.

Hot vaginal injections oftentimes control hemorrhage. They should be exceedingly hot and their use protracted. The effect of the heat is to produce a stimulation of the vaso-motor constrictor nerve, thus closing the blood-vessels contributing to the hemorrhage.

It has been recommended, in cases of profuse menorrhagia occurring in slender, anemic women, to resort to tamponing the vagina at each menstrual period for several consecutive months—a proceeding that does not stop the menstrual flow entirely, but which seems to do away with the excessive loss of blood. Should the amount of blood be still excessive and exhausting, in spite of the vaginal tamponing, no hesitation need be had in resorting to uterine tamponade. Under this treatment women frequently regain their color, strength, and flesh.

In cases of hemorrhage from lacerated cervix or cancer in the cervix uteri, the use of the persulphate of iron, with iodoform or boracic acid, is an excellent treatment. Where these fail vaginal tampons may be relied upon.

DYSMENORRHEA.

DEFINITION.—Dysmenorrhea means painful menstruation. Normal menstruation is painless. A mild degree of discomfort and uneasiness experienced by many women is not included in this disorder. Many women suffer pain during menstruation upon moving around, but are free from it while lying down. Women experiencing mild suffering only can scarcely be included under the head of dysmenorrheic patients.

DESCRIPTION.—The different manifestations of pain in dysmenorrhea are very numerous. Some women experience pain until the flow is fully established, when all suffering ceases. Others have the prodromic suffering, which extends through to the second day of the flow. Others have the prodromic pain and that of the first day or two, to be followed by complete relief for a time, when it will again reappear during, for example, the last day of the flow. With some the pain occurs suddenly with the flow, extends through the whole period, and gradually disappears as the flow ceases. Again, other women have painful menstruation every second month, having no pain at the alternate period.

The *seat* of the pain varies in different women. In the vast majority, the pain occurs in the hypogastric region; in other cases it invades both the hypogastric and iliac regions. In still other cases it is circum-pelvic, starting from the lumbo-sacral region. Still other women have the pain located in one iliac region only. In severe cases it extends down one or both legs or up to the waist, or even to the axilla.

In the vast majority of cases of dysmenorrhea the pain is not severe enough to demand the attention of the physician, quietude and domestic remedies sufficing to relieve the suffering. Some cases are so severe as to demand medical interference. In the severest cases the general health is undermined, the nervous system yielding the most urgent manifestations, such as *hysteria gravior*, mania, and even epilepsy. One case came under the writer's observation many years ago, where it was necessary to perform artificial respiration for several hours during the flow. Some cases are so intractable as to defy remedial measures, necessitating the operation of oöphorectomy.

A certain phenomenon occasionally observed has been denominated intermenstrual dysmenorrhea. It is characterized by spasmodic pains in the iliac regions, occurring in the interval between the menstruations. It is only occasionally met with, is rebellious to treatment, and has been so severe as to demand the removal of the ovaries for its abolition.

In one form of dysmenorrhea the pain is slight in the beginning, and progressively increases until it reaches a climax, suddenly terminating in a gush of blood from the vaginal orifice. It is followed by a period of comparative relief from pain, which, in a few minutes or an hour or two, is succeeded by another similar paroxysm of suffering. This variety is seen in many cases of uterine flexions. It has been characterized, perhaps erroneously, as tubal colic.

Varieties and Pathology.—Writers have described many varieties of dysmenorrhea. While the tendency of this sort of teaching, unqualified, may be misleading, it is perhaps best to subdivide the subject into varieties for convenience of description. Above all, it must be borne in mind that dysmenorrhea is always a symptom of some pathological condition which utterly precludes the possibility of routine treatment. Indeed, any attempt to treat all cases alike is the merest charlatanism. The names given to express the different varieties of dysmenorrhea imply the leading pathological conditions. It must be understood that one or two, or even three, varieties of causes may be found in the same patient; therefore it is possible for one patient to have one or more varieties of dysmenorrhea, just as any person may have one or two or three different kinds of headaches. It will be seen that the completest examination of each case is absolutely necessary in order to intelligently institute treatment. Like amenorrhea, menorrhagia, and metrorrhagia, this condition is merely a symptom, not a disease. The following varieties have been described by authors: 1. Neuralgic; 2. Congestive; 3. Mechanical; 4. Ovarian; 5. Membranous.

1. Neuralgic.—This variety may not be associated necessarily with any disease of the pelvic organs. It manifests itself chiefly in the class of patients of the nervous or neuralgic temperament.

Causes.—Any constitutional condition which tends to develop the neuralgic disposition, as anemia, chlorosis, gout, rheumatism, syphilis, malaria, and the like, will precipitate neuralgic dysmenorrhea. This form of the complaint includes cases from the very lightest to the very gravest variety.

2. Congestive.—During menstruation the pelvic organs are

congested. When it is normal no pain exists. When there is a state of chronic inflammation, or distorting and deforming adhesions from pelvic inflammation, the normal congestion becomes an abnormal one, and pain results, constituting what is known as congestive or inflammatory dysmenorrhea. Even in conditions of chronic endometritis the menstrual congestion is sufficient to produce this form of dysmenorrhea. The various forms of tumors, as fibroids and polypi, can also constitute a cause.

This form of the malady is seen most frequently in women who have borne children or have aborted, and in women who began the menstrual life and maintained it for a given length of time without pain. It is the variety which is nearly always traceable to some disorder of which the patient will give the history.

3. MECHANICAL.—In this class of cases there is some obstruction to the ready outflow of the menstrual fluid. It can come from a great variety of conditions. It may occur from stenosis of the cervical canal, produced by any mechanical cause, as severe inflammation, pressure from tumors in the neck of the uterus, or from excessive use of caustics. It may arise from flexion or version of the uterus. It may spring from an intra-uterine polypus acting as a ball valve at the internal os, or from a stricture of the vagina, or from an imperforate hymen.

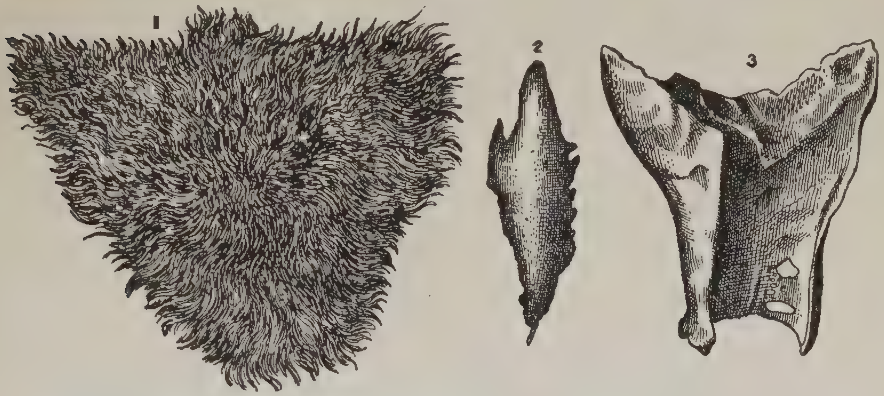
In this variety the commonest characteristic symptom is the paroxysmal pain accompanied by a gush of blood from the genital passage. However, the pain is by no means always paroxysmal.

4. OVARIAN.—In this class of cases a careful examination will almost always discover some enlargement or tenderness of the ovaries, and reveal a condition which is called chronic ovaritis. As chronic ovaritis is never wholly free from some pelvic peritonitis, it is easy to understand how the congestion of the menstrual epoch will produce a great amount of pain both before and during the flow. By careful examination through the conjoined manipulation, one or both ovaries can be detected prolapsed somewhat, and perhaps nearer to the uterus than is normal. They are characterized by their increase in size and by their excessive tenderness. The inaccessibility of these organs to treatment indicates the extremely grave prognosis for such patients.

5. MEMBRANOUS.—Patients of this class shed, with the flow, a membrane which is the *decidua menstrualis.* This membrane, when whole, consists of a sac representing the cast of the triangular

cavity of the body of the uterus with its three openings, of the Fallopian tubes and the os uteri. It may come away whole or in the shape of shreds and fibres. Microscopically, it is found to be what might be denominated hypertrophied *decidua menstrualis.* The blood-vessels are easily seen increased in size, capacity, and number; the interglandular substance is greatly increased; there is a great development in the utricular glands, whose mouths are visible even to the naked eye. Pregnancy is excluded by the entire absence of the chorionic villi.

Fig. 88.



Membranes of Membranous Dysmenorrhea. 1. Membrane viewed under water; 2. Small piece of membrane; 3. Smooth cast of uterus.

The pathology of the dysmenorrheal membrane has received a vast amount of attention. Many varying theories have been advanced, maintained, and abandoned. The one that is, perhaps, the most favored to-day, is that it is an exaggeration of a physiological process with a varying pathogeny. In other words, the membrane is regarded as an exaggerated *decidua menstrualis* of inflammatory origin. It would seem that the therapeutic proof of this theory affords the most convincing argument. Whatever cures the accompanying endometritis in cases of membranous dysmenorrhea is certainly, to-day, its most reliable and satisfactory treatment.

Symptoms.—Pain is the one symptom characterizing every variety of dysmenorrhea. A few of its variations are so greatly pathognomonic that observation of them is sufficient for a correct diagnosis.

In the neuralgic variety the undulatory character of the pain is always pathognomonic. In addition to this characteristic of the pain, a marked degree of hyperesthesia of the cutaneous surface of the lower abdomen will always be found present. The coexistence of neuralgia in other localities and the identification of Valleix's painful points will facilitate the diagnosis. The pain in this variety shows itself before the flow has been established, and disappears as soon as it comes on, or continues through to the end of the flow, coming and going with no apparent cause. It is in this form of dysmenorrhea that we find the largest number of incoercible cases. The pain may become so agonizing as to make the patient delirious: its severity before, during, and after the flow may be so demoralizing to the physical strength of the patient as to ruin her health entirely. More cases of destruction of the general health occur in this variety than in all the others combined.

The symptoms of the *congestive variety* are observed chiefly in patients who have previously menstruated painlessly. The pain, coming on suddenly, is very severe in this class of cases, seems to be confined to the pelvis, and is accompanied by a diminution or cessation of the discharge. The constitutional symptoms are always marked: the pulse is increased in frequency, the temperature elevated, the skin hot and dry, and the eyes suffused. There is severe headache, occasional delirium, marked diminution in the renal secretions, and general restlessness. In this variety of the complaint the patient usually experiences pain upon walking, is easily fatigued, has leucorrhea and an irritable bladder, not only at the time of the flow, but during the intermenstrual periods. There is a marked contrast in this class of patients to the women suffering from neuralgic dysmenorrhea. The pelvic malady seems never to leave them between menstruations, whereas women who suffer from a purely neuralgic dysmenorrhea experience trouble chiefly at the time of menstruation. The syndroma of this form of the disease can readily be perceived by bearing in mind the fact that the uterus possesses a pathological congestion, not only between the menstruations, but throughout all the menstrual flow.

The symptoms of the *mechanical* or *obstructive form* of dysmenorrhea are peculiar and very characteristic. What has been styled *uterine colic* is the kind of pain most frequently encountered. After the menstruation has continued for several hours, and some blood has accumulated in the fundus uteri sufficiently to distend it, uterine contractions are set up which increase in intensity, until the accumulated blood is forced out of the uterus in a gush. Then the severe pain ceases for a time until the distention from re-accumulation occurs, which is followed by another series of uterine contractions, terminating in the expulsion of the blood. The obstruction to the outflow of the blood may exist in the cervical canal, in the vagina, or the vulva. When the obstruction exists in the cervical canal, the uterine contractions will expel a small clot of blood, followed by a gush, affording complete relief from suffering for the time being. The symptoms are so marked that the diagnosis of this form can be made without any hesitancy, as a rule. The physician must be on his guard, however, not to be deceived by the accumulation of the menstrual fluid in the vagina, and its periodic expulsion in gushes, according as the patient assumes various positions, or the cul-de-sac becomes filled.

The symptoms of *ovarian dysmenorrhea* are characterized by a period of prodromic suffering extending over several days. The pain is dull in character, confined to one side when originating from one ovary only, extends around the pelvis, over the nates, and down the thighs, and is peculiarly liable to be accompanied by an invasion of the general nervous system and depression of spirits. Painful and tender mammary symptoms often occur in this variety. Intermenstrual dysmenorrhea is observed more frequently perhaps in this than in any other form of the complaint. Sometimes it occurs on the ninth, sometimes on the fifteenth, sometimes on the twelfth, and sometimes on the seventh, day after cessation of the menstruation. Occasionally it is seen only after every second menstruation. A pelvic examination often reveals an enlarged, tender, and prolapsed condition of one or both ovaries. It must not, however, be supposed that in all cases of enlarged and tender or prolapsed ovaries, ovarian dysmenorrhea will be found. Not every case of ovarian dysmenorrhea presents a detectable pathological condition of the ovaries.

MEMBRANOUS DYSMENORRHEA.—In this variety the pains usually begin with the flow. After being ushered in they increase as the flow progresses, until the type of veritable labor-pains is reached. During the repetitions of these contractions the os uteri dilates, and the membrane is shed in its entirety or in shreds from the vaginal orifice. Usually the pain ceases at this time; then ensues a moderate menorrhagia, which soon disappears. This is followed by a purulent or sero-purulent discharge, continuing indefinitely from a few days up to the ensuing menstruation. Sterility is the rule in this class of patients, and the women are of an extremely neurotic tendency. The one characteristic of membranous dysmenorrhea is the membrane.

Diagnosis.—The diagnosis of *neuralgic dysmenorrhea* involves the consideration of the entire nervous system. The neuralgic temperament or diathesis is unmistakably present. Valleix's tender points are easily determined. The undulating characteristic of the pain is always present. The pain is not like labor-pains, as in membranous dysmenorrhea, and the suffering is not continuous, as it is in the congestive variety. There are no constitutional disturbances between the menstruations; there are no signs of endometritis, of ovarian or perimetritic disturbances. The pain is habitual, and not paroxysmal. Between the menstruations there are no pains, no leucorrhea, and the patient appears to be in her ordinary good health. In the severer forms invasion of the general health often occurs, presenting, in degrees of varying intensity, neurasthenia, hysteria gravior, delirium, mania, or epilepsy.

In the *congestive variety*, *without* a conspicuous endometritis or general metritis, the attack of pain is sudden. There is an absence of constitutional disturbances, and the pain ceases after the flow stops. In the congestive variety *with* a marked uterine inflammation there is always constitutional disturbance, such as rise of pulse and increase of temperature, and the patient is never wholly free from pelvic suffering between the menstruations. This characteristic is in marked contrast to the dysmenorrhea from neuralgic origin.

The diagnosis of the *mechanical* or *obstructive* form of dysmenorrhea is made chiefly from the expulsive and paroxysmal occurrence of the pains. A physical examination is necessary to complete the diagnosis and to discover what is the underlying pelvic condition present. Conjoined manipulation will easily disclose the presence of anteflexion. Tumors in the cervix may easily be discovered by the finger. Deflections of the uterine canal can be demonstrated by the use of the sound. Should the obstruction exist in the vagina, it will soon become apparent upon a digital examination. Occasionally it will be found that the only obstruction existing in the uterine canal is an unusual reduplication of the lining membrane of the uterus at the internal os, and a spasmodic constriction of the muscular fibres at the opening.

Prognosis.—Dysmenorrhea has usually a favorable prognosis. In the vast majority of cases of the neuralgic variety the prognosis is entirely favorable. Occasionally it will be found that an incoercible case of neuralgic dysmenorrhea will be encountered, wherein all medical treatment will prove utterly unavailing. In such cases there seems, unfortunately, to be but one cure, and that is to induce artificially the change of life by the removal of the ovaries. Where there is one case demanding resort to this operation, there are many thousands that need nothing of the kind.

Of the congestive variety, the prognosis is almost always favorable, the cure of the patient depending upon the success of the treatment instituted for the inflammatory condition present.

The prognosis of cases of mechanical and obstructive dysmenorrhea depends wholly upon the success of the treatment instituted to abolish the obstruction.

In ovarian dysmenorrhea where organic degeneration of the ovaries exists, the prognosis is favorable only in case of removal of these organs. Where such degeneration is absent, the treatment of ovarian congestion or of ovaritis, when successful, will cure the dysmenorrhea.

Membranous dysmenorrhea presents a favorable prognosis in the greatest number of cases. Occasionally patients will be seen whose general health is so degenerated that all treatment of this form of the malady proves utterly fruitless.

TREATMENT.—The variety of the dysmenorrhea always decides the treatment. No case is intelligently treated wherein an attempt at satisfactory diagnosis is not made. In general, it may be said that the routine treatment of any form of dysmenorrhea by means of the preparations of opium and diffusible stimuli, is to be condemned. There is no question that opiophagists and drunkards have been made by this line of inconsiderate treatment. This assertion may be disputed, and is disputed, by some physicians, but their observations must be considered too limited to be reliable. This general statement may be made concerning the use of these two remedies in dysmenorrhea: He who is compelled to resort frequently to opium and stimulants, must be considered devoid in diagnostic ability, and consequently ought not to be entrusted with the management of such cases.

Neuralgic Variety.—The treatment of this form may be subdivided into general and specific treatment. In the beginning of the treatment the physician must carefully ascertain the general state of the patient. If she be of the rheumatic, gouty, or syphilitic diathesis, this must be met by the usual remedies; in other words, the physician must treat assiduously the systemic condition which seems to predispose to the development of this neuralgia. The daily free administration of laxatives and diuretics is advisable. Should a local cause for the constipation be found in the anus or rectum, it should be removed by surgery or otherwise. Free daily evacuations of the bowels are indispensable to the restoration of the physiological balance of these patients. Constipation may lead to fecal anemia. In women thus affected neuralgic dysmenorrhea is extremely common. Rheumatism should be treated with colchicum, guaiac, the salicylates, and the preparations of potash. Gout requires the administration of minute doses of calomel, as one-twentieth of a grain three times a day, and with the citrate of potash or lithia.

Syphilis calls for mercury and iodides. An anemia demands tonics. An underlying fermentative dyspepsia, which may be one source of degenerated general health, requires gastric lavations, creasote, glycozone, and other antiseptic remedies. When the first consideration of the treatment of the patient—namely, constitutional treatment—has been provided for, then attention should be turned to remedies specially addressed to the relief of the suffering. In this class of patients purely antineuralgic remedies oftentimes yield most brilliant results. Phenacetin and antipyrine will relieve a large number of these cases. Many remedies have been recommended to be given a week before the flow comes on, to prevent the pain arising in neuralgic dysmenorrhea. Apiol has been given as a preventive of these pains, five minims in a capsule three times a day for one week before the flow appears. Five drops of the tincture of pulsatilla, in water, three times a day, is similarly recommended. If given for a week beforehand, guaiac or the sodium salicylate will oftentimes prevent an attack of neuralgic dysmenorrhea in women of the rheumatic diathesis. For the treatment of the pain, when it has occurred, auxiliary measures should not be neglected, such as rest and the application of warmth to the skin. The best results are perhaps yielded by ten or twenty grains of antipyrine or phenacetin, repeated hourly, until two or three doses, if necessary, are given. The best effect from these remedies is obtained when the patient lies with closed eyes in a quiet, darkened room for half an hour after taking them. Usually one dose of phenacetin is sufficient; sometimes a second or third dose is necessary. The well-known depressant cardiac action of the remedy can best be anticipated, if necessary, by the administration of twenty or thirty drops of the tincture of digitalis. This remedy, digitalis, is occasionally necessary. Nitro-glycerin and amyl nitrate, given until flushing arises, oftentimes produce excellent results. Six-grain doses of the oxalate of cerium every hour have been recommended. The tincture of cannabis indica, in twenty-five drop doses every three hours, given even to the production of hallucinations, is oftentimes effective. Chloral hydrate in ten-grain doses, repeated hourly until three or four doses have been given, will often relieve pain. Where the spasmodic element appears to exist, as will be indicated by a great diminution of the flow, the solanaceæ will be extremely useful. Thus belladonna, hyoscyamus, or stramonium given to the production of mydriasis is often very effective.

A general hot bath, from twenty to thirty minutes, frequently produces great relief.

Occasionally the paroxysms of pain are so terrible that we are justified in using hypodermic injections of morphine and atropia, but they should always be the last resort.

The treatment of the patient, in cases so severe, should be most assiduous and careful, to ascertain if it be not possible to avoid the further use of opium. Very rarely a case of incoercible dysmenorrhea, mentioned above, will resist the treatment—even that of hypodermic injections—when the removal of the ovaries for the artificial induction of the menopause will be imperatively demanded.

The Congestive Variety.—Herein the treatment must be directed by the diagnosis of the cause of the congestion. If it be due to the plethora of a retro-displacement of the uterus, the organ must be properly sustained. A wool tampon soaked in glycerin, adjusted with the patient in the genu-pectoral position, will suffice to thrust the fundus forward into its proper place, where the organ can empty itself satisfactorily. If upon examination the uterus is found to be decidedly congested, as shown by the distended condition of the blood-vessels or by the purple appearance of the cervix, leeches or scarification will suffice to relieve. Should the attack be precipitated by catching cold, the use of the saline cathartics, a diuretic, and a diaphoretic will be indicated. When the congestion arises from the pressure of an extraneous growth, either within or without the uterus, the case will be cured only upon the removal of the cause.

Mechanical or Obstructive.—The best-recognized treatment of ordinary cases of cervical constriction, whether acquired or congenital, is forcible dilatation. If this be decided upon, the patient should be thoroughly anesthetized, placed in the lithotomy position, the cervix exposed by the use of retractors, seized with the vulsellum forceps and drawn down toward the vaginal orifice. The direction of the uterine canal should be determined by the use of the uterine sound. If the cervical orifice be too small to admit the blades of the Goodell dilator, a narrow dressing forceps can first be passed within the internal os, and its blades sufficiently separated to enable the Goodell dilator to be subsequently introduced. With the set-screw this dilator can be opened to the extent of an inch or an inch and a half, five or ten minutes being consumed in its accomplishment. If any evidences of endometritis exist, the endometrium should be mildly curetted. Should granulations be brought out, then the curetting must be very thorough and the entire endometrium gone over systematically. It is not necessary to wash out the uterine cavity with an antiseptic liquid, because it can be thoroughly emptied with the curette. The irrigation can, however, do no harm, and should be practised. A narrow piece of iodoform gauze should then be packed into the uterine cavity until it is filled, and allowed to remain for a space of two days. Subsequent pain of uterine contractions can be held in check by the use of moderate doses of opium in some form. This method of relieving mechanical dysmenorrhea is remarkably successful in the majority of cases, but not in all. Direct electrolytic treatment of the cervical canal, in a manner similar to that used in the treatment of the male urethra, has been urged as an absolutely certain one, in preference to the dilatation measures.

Sponge, laminaria, and tupelo tents have been used a great deal in the past. Progressive gynecologists rarely resort to their use at present, because of the possibility of sepsis following. Forcible dilatation has been found much preferable.

When the constriction does not exist within the cervical canal, it is usually the result of some severe inflammation, as from the use of caustics or from some cervical laceration occurring in labor. In such cases it is necessary to lay open the internal os by cutting with a knife or scissors. In order to keep the os patulous the use of the intra-cervical stem pessary for two or three months generally suffices. When the constriction arises from flexion, the favorite method of treatment is the use of an intra-uterine stem pessary, constantly worn for a year or longer. In married women the use of this stem pessary is often followed by conception. If the gestation go on to term and end in a normal labor, the involution of the uterus is usually followed by a return of the flexion. In this manner it is shown that uterine flexions are oftentimes in reality incurable. To meet this condition the operation for the formation of an artificial os uteri upon the convex side of the cervix has been devised. It consists of the division of the cervix up to the point of the flexion and the turning in of the mucous membrane to form an artificial os uteri. This surgical procedure is of such recent introduction that the verdict concerning its merits is still held *sub judice.*

When the obstruction arises from an intra-uterine polypus, its removal constitutes the only relief.

Obstruction residing in the vagina must be treated by dilatation either by large bougies, tents, or incision.

Should the obstruction arise from syphilis, constitutional treatment must be conjoined.

Where the obstruction is produced by an imperforate hymen, the only relief consists in its division.

If a fibroid tumor constitutes the cause of obstruction, one of the methods for disposing of this condition must be employed.

The Ovarian Variety.—The treatment of this class of cases is perhaps the least satisfactory of all classes of dysmenorrhea. Should pregnancy occur, the nine months of rest secured to the ovaries may become of signal service. However, in such cases sterility is the rule. It is especially in this class of cases that opium and alcohol should be avoided. Remedies to soothe the local irritation and to decongest the pelvic organs are to be resorted to. The use of the wool-glycerin tampon accomplishes this object the most effectually of all known means. During the flow complete rest in bed and low diet, and the free use of bromides for a few days before the flow begins, will make many of these patients quite comfortable. Hyoscyamus, cannabis indica, exalgine, and stramonium oftentimes give satisfactory results. Internal medication in this variety of cases is more often unsatisfactory than otherwise.

Where unmistakable evidences of organic ovarian disease exist, the operation for the removal of the ovaries is demanded. Even the removal of the ovaries will at times fail to give the expected relief. Whatever is done to relieve the pain of this variety, short of oöphorectomy, must, as a rule, be repeated monthly.

Membranous Variety.—The uncertainty of the pathology of this disorder has led to the most astonishing variety of treatments. Indeed, it can be said that the same uncertainty of treatment exists to-day that existed a quarter of a century ago. The largest number of successful treatments of cases has followed the repeated dilating and curetting of the uterus. Many times these treatments fail; many more times they are successful. Internal treatment for its cure is wellnigh abandoned. A few years ago large doses of iodide of potassium were used; this is now abandoned. All varieties of constitutional treatment have been tried and abandoned. The consensus of opinion is now centred chiefly upon the treatment by dilatation and curettement, in conjunction with the application of chloride of zinc or carbolic acid, for the purpose of destroying the portion of membrane left behind by the curette.

STERILITY.

Synonyms.—Barrenness; Infertility; Lat., Sterilitas matrimonii; Fr., Stérilité; Ger., Unfruchtbarkeit.

Sterility in the female implies an inability to bring forth a living child. It involves two points for consideration: first, her inability to conceive at all; and, second, her inability to complete successfully the period of gestation. Many women never conceive at all. Many other women conceive, but are unable to complete the period of gestation.

Women who never conceive are said to be absolutely sterile. Women who have borne one or two children and do not conceive thereafter are said to be relatively sterile. While a woman is nursing her new-born child, as a rule, menstruation does not appear. During this period sterility generally exists, although women occasionally conceive even under these circumstances. This condition may be called physiological sterility. Under this heading is included that form of sterility which exists and is permanent after the woman has passed the change of life.

Etiology.—Several organs are involved in the process of genesis in the female. The essential element of this process is the ovum, which is supplied by the ovary. The ovum is conveyed from the ovary through the Fallopian tube to the uterus, where it meets the spermatozoon, and genesis follows, provided it has not been impregnated at some point between the ovary and the uterus. The semen reaches the uterus through the vagina. Consequently, the question of sterility involves the investigation of the condition of, first, the ovaries; second, the oviducts; third, the uterus; and, fourth, the vagina. In addition, upon the general condition of the patient alone non-conception often depends. Under this head may be classed the extreme gouty vice, the syphilitic taint, anemia, great obesity, chronic alcoholism, and spasmodic dysmenorrhea.

The Ovaries.—1. The investigation of the ovaries in sterility includes inquiry into the possibility of the absence, or of the imperfect development, of these organs—conditions rarely met with excepting when the other sexual organs are anomalous.

2. Inflammation of the ovaries, chronic or acute, may result in such adhesions of the organs that the ovum is totally prevented from entering the oviducts. It may lead to arrest of function, so that the ovum can no longer be matured. The ovary may become so imbedded in inflammatory deposit that extrusion of the ovum from its capsule is no longer possible.

3. Structural degenerations of the ovary may exist—*e. g.* cystic, carcinomatous, sarcomatous, and interstitial changes—and are generally attended with sterility.

4. Displacement of the ovary, often attended with chronic inflammation, may place it beyond the reach of the fimbriated extremity of the Fallopian tube so completely that the ovum cannot be transmitted to the uterus.

THE FALLOPIAN TUBES.—1. Absence or defective development of the oviducts is usually associated with other abnormalities of the sexual system, and causes hopeless sterility.

2. Inflammation of the oviducts is a cause of sterility. It may affect the serous coat, resulting in such fixation of the tubes as to prevent the morsus diaboli from coming in contact with the ovary, or in the formation of constricting bands that occlude the calibre of the tube. It may attack the mucous lining of the canal, and result in the production of secretions which are destructive to the spermatozoa or the ova, or it may result in permanent occlusion of the opening of the tube, whence may follow collections of blood, pus, or serum. In either case the ovum is prevented from descending to the uterus, and sterility follows. Of most importance is the destruction of the epithelia lining the mucous layer of the tube, with their cilia, resulting in the inability of the ovum to pass along the oviduct, either before it has met the spermatozoon or afterward, in the former case the result being sterility; in the latter, ectopic gestation.

3. Degeneration of the tubal structures produces a hopeless occlusion of the canal, and thus causes sterility.

THE UTERUS.—Defective development of the uterus assumes various forms, such as its total absence, its under-size, or its abnormal lateral growth into either a unicornus or a bicornus uterus. Conoidal cervix, with the commonly attendant stenosis of the os, may be classed as one of the variations of defective development. The last-mentioned condition constitutes one of the most frequently removable causes of sterility.

Degenerations.—1. Myomata often cause infecundity, but they are not always a barrier to conception. The coexistence of this degeneration and of pregnancy constitutes one of the most serious conditions encountered by the obstetrician.

2. Sarcomata seem always to prevent pregnancy.

3. Carcinomata, if extensive enough, cause sterility. In their early stage conception is often possible, and is now and then encountered.

Abnormalities of Involution.—An excessive involution (hyper-involution) or a deficient involution (subinvolution) often constitutes a barrier to conception. The writer recently saw a healthy patient, aged twenty-seven, who bore a child at twenty-one years of age, and had not menstruated since that event. The uterus measured but one and one-fourth inches in depth. The organ may be still further decreased in size, even to a quarter of an inch.

Subinvolution of the uterus is often accompanied with an inflammatory state, completely preventing the occurrence of pregnancy.

Inflammation of the uterus or the circumjacent tissues is a very common cause of sterility. The morbid process, according to its seat, may be endocervicitis, endometritis, metritis, or pelvic inflammation. Often two or more of these conditions coexist and render the cure very tedious or impossible. Endometritis may be accompanied by abnormal secretions destructive to the spermatozoa; there may be a dilated uterine cavity; the lining membrane of the uterus may be made so unhealthy that it becomes impossible for a fertilized ovum to secure a lodgment thereon; or the inflammation may cause more or less occlusion of the uterine orifice.

Displacements.—Malpositions of the uterus include prolapse, flexions (retroflexion, anteflexion), and versions (anteversion, retroversion, and lateroversion).

Anteversion and anteflexion exist most frequently in nulliparæ. Retroversion and retroflexion exist most frequently in those who have borne children. Lateral displacements are present when an inflammation has existed in either broad ligament, resulting in its shortening, or when some foreign growth or an inflammatory deposit exists on the side of the pelvis, opposite to the displacement, crowding the uterus away from its normal position.

THE VAGINA.—This organ may be so injured, or may become the seat of discharges so fatal to the semen, that it becomes a source of sterility.

Malformations.—The vagina may be absent congenitally. Its occlusion is very rare, but exists, both as a congenital and an acquired condition. A severe vaginitis has been the cause of an almost total occlusion, by the agglutination of the vaginal walls. The hymen is sometimes so hypertrophied that it becomes a barrier to copulation. Unnatural shortness of the vagina renders it incapable of retaining the semen for a suitable length of time.

Inflammation.—Vaginitis nearly always produces discharges fatal to the semen. It is occasionally productive of that condition of spasm called vaginismus, but this is more frequently caused by other conditions.

Injuries.—Extensive perineal lacerations often become causes of sterility by shortening and straightening the vagina. Fistulæ may also prevent conception.

Degenerations.—Elephantiasis labiorum prevents coitus, and thus becomes a barrier to insemination. Extensive urethral caruncle often interferes with successful intercourse.

General State of the Patient's Health.—An indefinable something in the patient's general condition is oftentimes the apparent cause of sterility. The proof of this statement consists in the fact that women sterile when in poor health often conceive when their general condition has been improved by remedies, by change of climate, or by travel. Some women are sterile because of the presence of discharges from the genital tract which have their origin in a systemic taint. The lithemic state, for example, may give rise to discharges, which cease when an antilithic course of treatment has been followed, and conception thereafter may follow. Many cases of sterility of this form have been wholly removed by a course of treatment at suitable mineral springs.

Under this head may also be mentioned that variety of sterility which is dependent upon some obscure incompatibility of the parties, illustrations of which every physician of experience has encountered. A woman, sterile in many years of married life, who has been for this reason abandoned by her husband, eventually secures a divorce, is married to a second husband, and bears a number of children. The old illustrations of Augustus and Livia and of Napoleon and Josephine are quoted by writers on sterility.

It is well never to lose sight of the fact that the cause of sterility may be resident in the male, and when no cause can be found resident in the wife, a critical examination of the husband should be made. Not infrequently the physician will be rewarded by the discovery of the defect. It is possible that, in a certain proportion of the cases, when the woman has conceived by a second marriage the defect existed in the first husband.

Diagnosis.—It is not always the case that only one of the foregoing obstacles to conception is present. Very often two or more of them coexist. When the causes of sterility are manifold in the same patient, it is obvious that the skill of the gynecologist will often be taxed in recognizing and removing them. A complete diagnosis can be arrived at only by an exhaustive examination. It is always a safe plan for the physician to endeavor to find all of the possible causes of sterility in his patient.

Frequently, after every discoverable obstacle to conception has been corrected, sterility will still exist.

Prognosis.—In no condition is the prognosis more uncertain. In a general way it may be stated that imperfect development or marked malformations constitute an absolute bar to conception.

In the same manner, it may be stated that removable obstacles to conception, as inflammations, flexions, versions, stenosis, some vaginal occlusion, or fistulæ, may be treated with a fair prospect of fruitful results. The apparently complete removal of these obstacles, however, only too often fails to render the woman fruitful.

Treatment.—A successful treatment of sterility in the female is secured by removal of all the obstacles to conception. Such treatment does not include that of sterility in the male, although many gynecologists investigate the male first, since about one case in ten of infecundity in marriages has its origin in the male. With this branch of the subject, however, the present article has nothing to do.

After the physician has discovered as many obstacles to conception as he can find, he must set about removing them. Insufficient treatment nearly always results in failure. In no department of gynecology is more persistence in treatment demanded.

Urethral caruncles, vulvar vegetations, and other sensitive excrescences must be removed or destroyed.

Vaginal stenosis or contraction must be stretched, and the canal kept patulous.

Cervical stenosis must be overcome by sea-tangle or tupelo tents or by stretching with dilators. Division of the cervix by the hysterotome has been successfully practiced in the past, but is at present falling into disuse, forcible dilatation being preferred.

Uterine deviations must be corrected. Versions can often be rectified by suitable pessaries. It has been suggested that anteversion may be corrected by allowing the bladder to become distended with urine, thus pushing the fundus uteri backward and throwing the cervix sufficiently forward, to place the os in a direct line with the seminal ejection; the entrance of the semen into the cervical canal is thus facilitated. Similarly, retroversion, it is alleged, may be temporarily corrected by allowing the rectum to become distended with feces, whereby the fundus uteri may be crowded forward. It would seem most probable that both these procedures would defeat the desired object. Either one or the other would tend to destroy the natural S-shape of the vagina, producing, in a milder degree, the same condition of straightening of the canal as is produced by laceration of the pelvic floor. Especially in the case of constipation the result would be a tendency to non-retention of the semen in the vagina. The theory of sterility being due to a backward or downward position of the cervix has long been exploded.

Flexions demand the use of the intra-uterine stem pessary.

Hyperinvolution may be treated with the galvanic intra-uterine stem pessary. Similarly, attempts may be made to stimulate the growth of an imperfectly developed uterus.

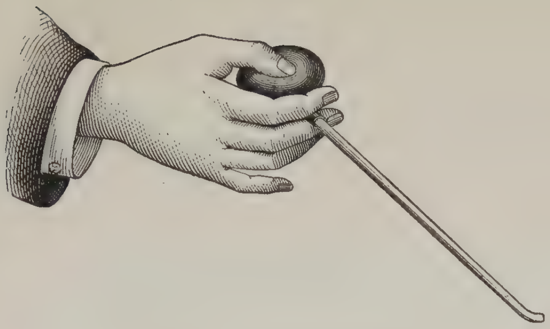
Inflammations must be treated *secundum artem.* Various antiphlogistic methods of treatment are in vogue. Cauterizing applications, hot-water douches, glycerin tampons, the dry treatment of Englemann, etc., each has its adherents.

Morbid growths on the endometrium must be removed or destroyed.

Quite exceptionally, the method of introducing semen into the uterus by means of a syringe and tube has been used, it is alleged, successfully.

In the treatment of all cases of sterility the physician must never ignore the general condition of the patient. Systemic vices must be eradicated as far as possible. Many cases of sterility can be cured by general treatment. Repeated abortions indicate the possibility of the syphilitic taint. The existence of this vice in a

Fig. 89.



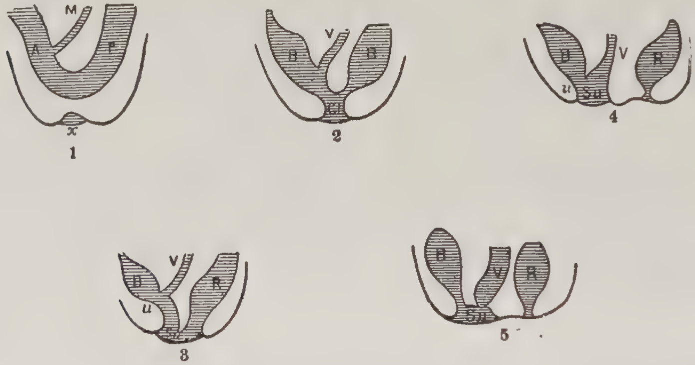
Apparatus for Artificial Impregnation.

marked degree is an almost certain obstacle to the chances of gestation being completed, and it must therefore receive continuous and persistent treatment for a period of at least two years.

ANOMALIES OF THE FEMALE GENERATIVE ORGANS.

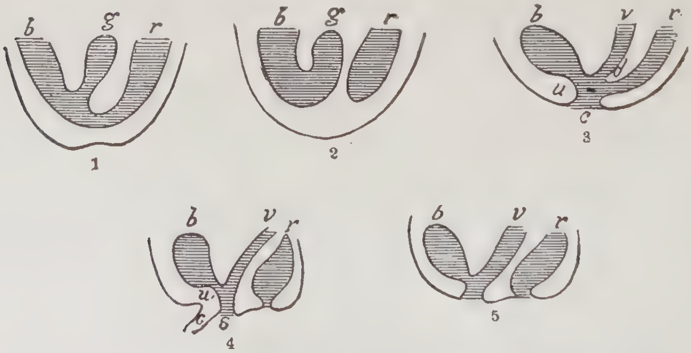
By anomalies of the female generative organs we mean the congenital (not acquired) partial or total absence, the arrest of, or excessive development, or a peculiar formation or malposition of

Fig. 90.



Development of the External Genital Organs—diagrammatic. 1. *P*, rectum, continuous with *All*, allantois (bladder), and *M*, Müller's canal (vagina); *x*, depression of the integument below the median tubercle, which by its progress inward forms the vulva. 2. The depression has extended inward to become continuous with the rectum and the allantois to form the cloaca, *Cl*. 3. The cloaca has split into the uro-genital sinus, *Su*, and the anus, *u*, by the down growth of the perineal septum. The Müllerian canals are fused to form the vagina, *V*, behind the bladder, *B*, and the orifice of the urethra, *u*. 4. The perineum completely formed. 5. The upper portion of the uro-genital sinus contracts to form the urethra; the lower portion persists and forms the vestibule, *su*, into which both urethra and vagina empty.

Fig. 91.



Malformation of the External Genital Organs—diagrammatic. 1. Complete atresia of the vulva: *r*, rectum; *g*, genital canal; *b*, bladder, communicating with both. 2. Complete atresia of the vulva: *r*, rectum, separated from the allantois; *b*, bladder, and *g*, genital canal, distended with urine. 3. Atresia of vagina and anus: *d*, perineum, incomplete; *b*, bladder; *v*, vagina, and *r*, rectum, open by a common cloaca. 4. Hypospadias in the female: first degree coincident with hypertrophy of the clitoris; *s*, persistent uro-genital sinus, to which succeeds the long vestibular canal; *u*, urethra, and *v*, vagina, opening into the vestibular canal; *c*, hypertrophied clitoris. 5. Hypospadias in the female, properly so-called; the allantois wholly transformed into a bladder, which opens directly, without the intermediate urethra, into the uro-genital sinus—that is, into the vestibule.

any part of the generative tract, considered first, in general, as abnormalities of the external and internal zones; and, secondly, as abnormalities in individual organs, dividing them for consideration into:

1. General anomalies of the two zones: true and apparent hermaphrodism.
2. Anomalies of the separate organs:
    - *a.* The external zone: the vulva, labia, nymphæ, clitoris, and the vagina; hypospadias and epispadias.
    - *b.* The internal zone: the uterus, Fallopian tubes, and ovaries.

I. GENERAL—TOTAL ABSENCE OF EITHER OR OF BOTH ZONES.

There is on record no authentic case of entire absence of both external and internal generative organs in the same person. Occasionally there have been reported cases of acephalic fetuses, prematurely born, in which no trace of generative organs could be discovered, but these are extremely rare; more than that, no authentic cases have been proven, although many have been described, in which the external genitals have been entirely lacking; in every case properly examined rudimentary processes have been found.

Foville reported a case in which there was absence of the nymphæ, labia, and clitoris, with a fusion of the vestibule; a minute opening only was present, the outlet of the urogenital canals, through which the urine and menstrual fluid passed. In this case Klebs claimed there was fusion of the raphé. Meckel has described some old cases of entire absence of the genitals, but in these cases there was a depression or an elevation where the vulva should have been, and the details of the examinations were so meagre that they cannot be called authentic cases. The complete absence of the internal organs of generation is an extremely rare anomaly, if it exists. Kussmaul describes a female in which the most careful examination showed no signs of uterus, ovaries, or tubes, and where the vagina existed as a minute opening. Emmet records a case where a woman, so called, had been married for two years, but had never menstruated. An examination showed that sexual intercourse had been carried on through the urethra and into the bladder. In this case he was unable to discover any signs of vagina or uterus.

Other writers have described similar cases, but in few of them has an autopsy been obtained, and then, in each case examined, rudimentary organs have been discovered.

True Hermaphrodism, in which one or more of the generative organs of the male and female are present in the same individual.

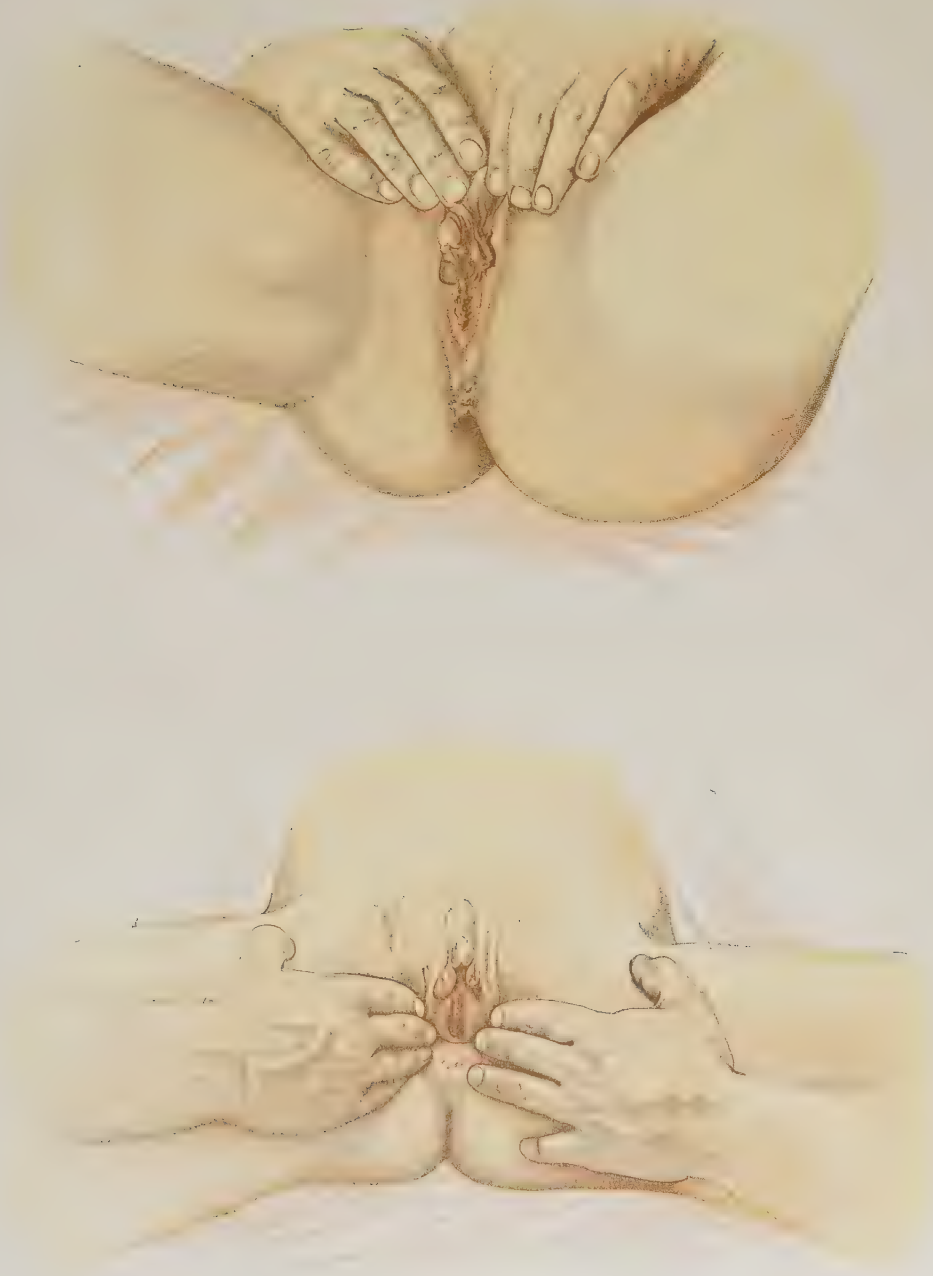
Dohrn denies the existence of true hermaphrodism in the human race, however common it may be in the vegetable and animal kingdoms, while Skene mentions Hildebrant and Bannon as having authentic cases which they reported. Klebs classified hermaphrodism into—

1. Bilateral, where the ovaries and testicles exist simultaneously on both sides;
2. Unilateral, where both ovary and testicle are present on one side at least;
3. Lateral, where the ovary and testicle are present on different sides.

Ahlfeld claims that there has never been on record a proven case of unilateral hermaphrodism, and that he has his doubts about the existence of bilateral hermaphrodism. Zweifel agrees with him in this. Ahlfeld mentions the cases reported by Heppner and Schnell of bilateral hermaphrodism, but there was so much difference of opinion about them that certainly nothing definite was proven. Zweifel quotes the following men as having recorded cases of lateral hermaphrodism: Sue, Barkow, Berthold, Bannon, Meyer, Gruber, and Klotz. Courty divides true hermaphrodism into lateral, transverse, and vertical or double, and says: "Two cases are now recorded —one by Rokitansky and another by Heppner—which prove to a certainty that the simultaneous presence of organs, characteristic of both sexes, may be found in the same individual, not only the one on one side, the other on the other, but simultaneously on the same side." The autopsy in Rokitansky's case in 1869 showed two ovaries with their tubes, a rudimentary uterus, and one testicle, with vas deferens containing spermatozoa. This individual menstruated regularly, and had an imperforated penis and a bifid scrotum. The case of Heppner, the second one he reported, was the autopsy upon a six weeks' infant, in which he found a complete internal generative apparatus, a penis, hypospadias, and two supernumerary glands, which he pronounced to be testicles. Slavjansky declared that these two supernumerary glands were ovaries, and not testicles.

Zweifel says of congenital hermaphrodism: "In not a single

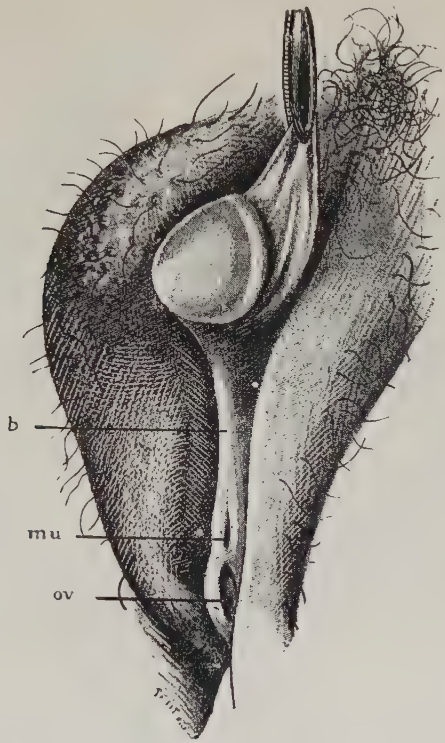
PLATE XII.



Pseudo-external Bilateral Hermaphrodism.

case as yet, however, have spermatozoa been found in hermaphrodites, the ejaculations consisting simply of such a fluid as even females secrete on irritation of their sexual organs." Still, it is certainly a fact that the tendency in the majority of cases is toward the male type, and that nearly all, if not all, authentic cases have been of lateral hermaphrodism. In apparent or pseudo-hermaphrodism the female may simulate the male type, by an abnormal development of the clitoris and a hernial descent of the ovary into the labia, as described by Auger; or, in cases of hypospadias the male may resemble the female, the fissure of the corpora cavernosa being taken for a vagina, and the penis, which in these cases is nearly always atrophied, being mistaken for an hypertrophied clitoris. In some of the cases described, the non-descent of the testicles into the scrotum made the diagnosis more difficult. *Vice versâ*, Junie, Coste, Engel, and Huguier describe cases of hypospadias in the female, with hypertrophy of the clitoris, that were regarded and reared

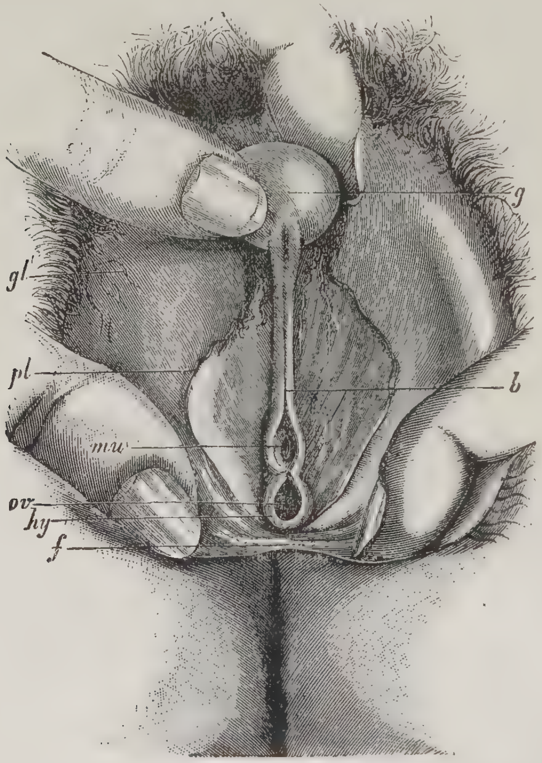
FIG. 92.



Pseudo-hermaphrodism proper. External genitals of Julia D—— (man). Feminine appearance of the parts with the penis raised and the thighs separated: *b*, frænum; *mu*, meatus; *ov*, vulvar orifice.

as males. Leopold recorded a case in which a male pseudo-hermaphrodite was married as a female. There existed, in place of the vagina, a cul-de-sac. Oldham cites two cases where herniated ovaries in persons who had never menstruated gave rise to a mistake of sex. Ricco and Steglehuer reported cases of the same sort.

Fig. 93.



Pseudo-hermaphrodism proper. External organs of Louise B—— (man): *g*, glans; *b*, frænum; *ov*, vulvar orifice; *hy*, hymen; *f*, fourchette; *pl*, nymphæ; *gl*, labia majora.

II. Anomalies of the Separate Organs—the External Zone, Vulva, Labia, etc.

Louis and Petit mention cases of acephalic monsters in which there was complete absence of the vulva. Two cases were described by Riolan in which the left labium majus was lacking. Kussmaul describes Rossi's case, where the vagina existed as a most minute opening, and Foville's case, referred to before, showed an absence of labia, nymphæ, and clitoris. Coste and Seggel have on record cases where the labia were undeveloped, being represented by little ridges of integument.

Meckel, Granville, and Mayer have cited instances where the labia majora have been rudimentary or lacking. There are, of course, many cases on record of a lack of development of the external genitals as a whole, and where the parts, even in adult life, resemble those of an infant. Cases of hyper-enlargement or multiplication of the labia are not so rare. Meissner, Morgagni, Winckel, and Neubauer mention cases where there have been three and fourfold labia and nymphæ. Zweifel quotes Halle as recording a case in which the nymphæ covered the anus. Among certain tribes (the Hottentots, for example) the labia are of enormous size and hang down for six or eight inches (the Hottentot apron).

Arnaud and Morpain describe cases of absence of the clitoris, and Mannosi refers to a case in which an autopsy showed no sign of even a rudimentary clitoris. Zweifel mentions Meissner as quoting unquestionable cases of congenital hypertrophy of the clitoris, reported by Tulpius, DeGraaf, Zachias Avicenna, Plater, Rhodius, and Panarali. Frick, Armand, and Coste report cases of hypertrophy where the clitoris was as large as an erect penis. Ahlfeld describes several cases of this sort in full. The clitoris, like all the other generative organs, may remain in an undeveloped state, and yet, according to some writers, may not be, properly speaking, an anomaly.

Congenital hypospadias and epispadias are not uncommon in the female. In epispadias the clitoris is split at its upper or lower portion, as the case may be. Roser, Schroder, Gosselin, and Testelin have reported cases. Roser's and Schroder's were operated upon and cured by Moricke and Frommel. In hypospadias the posterior wall of the urethra is lacking, the canal opening upward into the vagina. There is seldom a fissure of the clitoris in cases of hypospadias.

The Hymen.—Roze, in his interesting thesis, goes fully into the question of the abnormalities of the hymen, and Courty, in his work, discusses the question in full. Illustrations are given of the different anomalies.

Zweifel writes that "very likely, atresia of the hymen is not an anomaly of development," and quotes Briesky as expressing the opinion, that it is simply the secondary obliteration of a previously formed canal, through defective hornification of the superficial epithelium. Briesky in his chapter on congenital malformation says: "Hymenial atresia, however, is excessively rare as an acquired condition," and he states that he has but once met with a true atresia hymenalis in a new-born girl. The genitals were otherwise normal in this child. He gives an interesting list of eighteen cases of hymenalis and vaginal atresia operated upon and cured by him. Zweifel himself had a case of "atresia hymenalis" where the entire vagina was affected by this epithelial adhesion; so, too, the cases reported of double hymens are simply adhesions of the epithelial cells.

The Vagina.—Atresia or absence of the vagina may be partial or total, and, according to Courty, may coexist with absence of the uterus or with a normal uterus. Cook, Yagishita, Mattersdorf, and Barsony have lately recorded cases of congenital vaginal atresia. Atresia of the vagina, to quote Briesky, is probably due to a secondary adhesion, as is atresia of the hymen, rather than to an anomaly of insufficient formation. Bokal and Zweifel seem to agree with him in this theory. Briesky goes on to say that the arrest of development may be of two kinds—cloaca, due to defective division between the rectum and bladder, and the existence of intravaginal septa. The cloaca may be complete or incomplete; the latter may be uro-genital or recto-genital. "The atresia of the upper and middle portion of the vagina is due to the loss of the existing lumen of the divided or united vaginal portions of Müller's ducts," but when the lower vaginal part is wanting, there may be a total absence of the lower part of the Müllerian ducts. Courty describes complete uro-recto-vaginal cloaca in a new-born child, and a recto-vaginal cloaca in a girl of sixteen, who had an imperforate hymen and menstruated through the anus. He cites several other cases of cloaca more or less severe. There may be a transverse division of the vagina, the so-called double hymen, or a longitudinal division, either from right to left—a rare anomaly—or from before backward, the so-called double vagina. These divisions may be complete or incomplete. Puech states that more than one hundred cases of this anomaly have coexisted with anomalies of the uterus, and less than fifteen have been reported with a normal uterus. Great differences exist as to the length and breadth and shortness of normal vaginæ; anomalies of excessive length, etc., have been described by Toison, Scanzoni, Courty, Zweifel, and Puech.

Internal Organs (the uterus, Fallopian tubes, and ovaries).—*The Uterus.*—The division of uterine anomalies is as follows:

I. *Defectus uteri.* Total absence of the uterus.
II. *Rudimentarius uteri.* Rudimentary uterus.
III. *Uterus unicornis.* The one-horned uterus.
IV. *Uterus bicornis.* The two-horned uterus.
V. *Uterus septus.* Two-chambered uterus.
VI. *Uterus duplex or didelphys.* The double uterus.
VII. *Defectus et rudimentarius cervix uteri.* Defective and rudimentary cervix of the uterus.
VIII. Abnormalities of position.

Borner gives as the probable ultimate causes of the faults of development in the uterus the following:

1. Interference with the approximation of union of the two lateral organs which go to form the uterus.

2. Interference with the disappearance of the vaginal septum formed by the union of the median walls, which gives the double-cavity uterus.

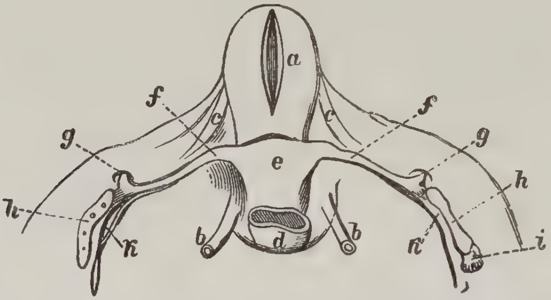
3. Nutritive disturbances in the original genital structure.

4. The fact that the obstacle to development may occur so early in fetal life that the foundations of a part of the uterine structure are not laid; in this way a segment on one or both sides may be missing. Hart and Barbour give as the two causes which together operate to produce malformations, arrested development and arrested growth.

I. *Defectus Uteri.*—Kussmaul and Borner claim that the uterus is rarely if ever entirely wanting, and that an autopsy on any case will reveal some vestige of a rudimentary or atrophied organ. Courty quotes a case in which there was claimed a total absence of the internal organs of generation. Borner, Quain, and Steglehuer report cases in which, on the living subjects, they could find no trace of uterus, ovaries, or tubes. In monstrosities in which no uterus was found, no traces of the Müllerian ducts were discovered.

II. *Uterus Rudimentarius.*—Veit, Langenbeck, and Nega have described cases where the uterus seemed little more than a thickening on the posterior vesical wall. Cases have been reported varying from this highest grade of deformity to the approach of the normal. The ovaries in these cases are generally present, and are often normal; there is no trace in the more pronounced cases of any periodic ovulation. Borner, Tauffer, Langenbeck, and Peaslee report cases where relief was sought for pains and backache occurring regularly each month, but without ever being accompanied by menstruation.

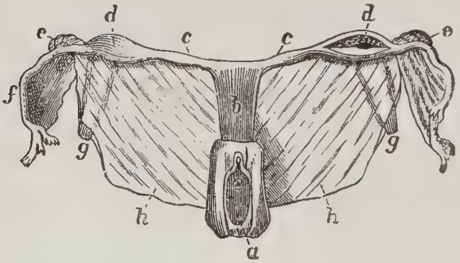
FIG. 94.



Solid Rudimentary Uterus, consisting of one Cervix and two Horns: *a*, bladder cut open; *bb*, ureters; *cc*, umbilical arteries; *d*, rectum; *e*, cervix; *ff*, cornua of the uterus; *gg*, round ligaments; *hh*, ovaries with follicles; *i*, rudiment of the Fallopian tube; *kk*, peritoneal duplicature of the ovaries.

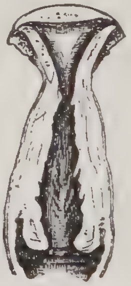
In a case of this sort Leopold operated and removed a rudimentary left uterine cornu and ovary with a perfect recovery.

FIG. 95.



Uterus Bipartitus: *a*, closed vagina; *b*, cervix uteri; *cc*, cornua of the uterus; *dd*, hollow expansion of the cornua; *ee*, atrophied ovaries; *f*, Fallopian tube; *gg*, round ligaments; *hh*, broad ligaments.

FIG. 96.



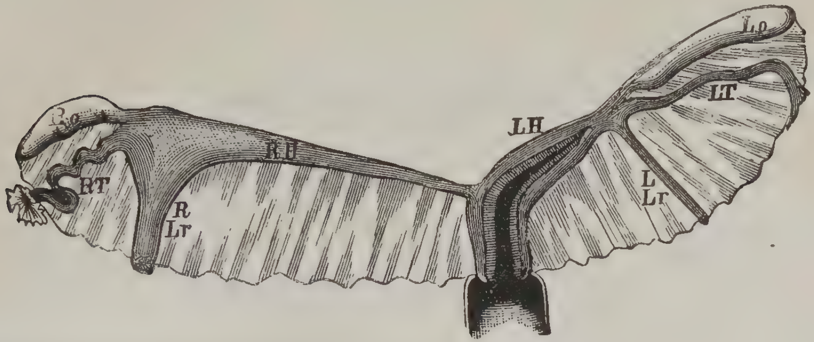
Infantile Uterus.

III. *Uterus Unicornis.*—An anomaly in which only one horn of the uterus has been developed, the Müllerian duct on the opposite side being atrophied, absent, or undeveloped. In this case the uterus is elongated and lies, obliquely bent, to one or the other side. Pregnancy in these cases occurs naturally, if the vagina be normal, and the shape of the uterus causes the fetus to lie vertically. In a case of Moldenhauer's, on delivery, rupture of the uterine walls occurred. Hegar, Frankenhausen, Borniski, and Borner describe cases where one cornu was atrophied.

Koeberle performed Cæsarean section and removed piecemeal a fetus from a right uterine horn.

Salin, Litzmann, and Sanger performed abdominal sections for the removal of diagnosed dead fetuses, and found that in each case conception in a uterus unicornis had occurred.

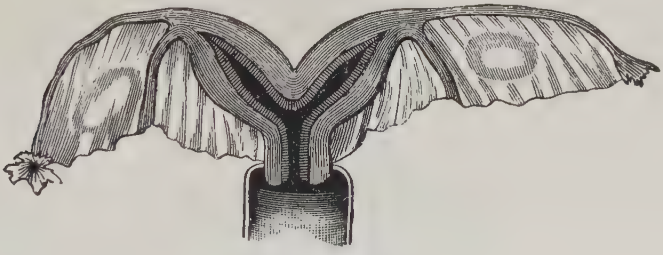
Fig. 97.



Uterus Unicornis with rudimentary cornu: LH, Lo, LT, and L Lr, horn, ovary, tube, and round ligament of the left side; RH, Ro, RT, and R Lr, those of the right side.

IV. *Uterus bicornis* is the result of a non-union of that part of the Müllerian ducts which goes to form the body of the uterus, leaving a division or fissure, more or less pronounced, from before backward over the fundus, separating the cornu, which projects at a more or less obtuse angle, each cornu having its distinct cavity. The uterus in these cases is often twisted on its long axis, and may contain a partition-wall. Cases have been recorded in which the uterus and the cervix have been divided into two separate compartments. The two horns are seldom equally developed, but the ovaries and tubes are generally normal; the vagina, however, often has the same duplexity. There may be atresia of one of the horns. In cases of extreme separation of the two halves, menstruation does not always occur simultaneously from the two cornu, and in some cases a pregnancy in one half does not interfere with menstruation from the other. Henderson made interesting notes on a case of this kind, watching the woman for sixteen years and delivering her of six

Fig. 98.

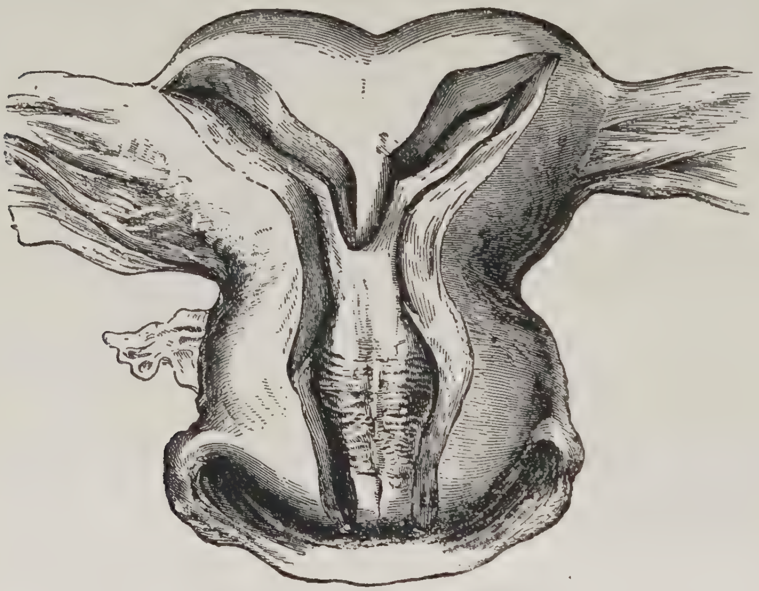


Uterus Bicornis.

children. In two or three of these pregnancies she menstruated during the whole term.

Gouterman reports a case in which pregnancy occurred in each horn separately and at different times.

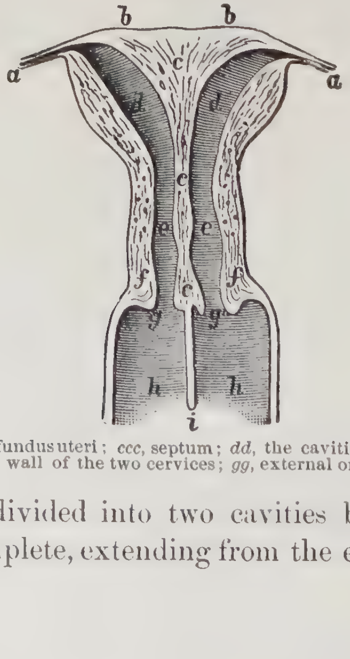
Fig. 99.



Bicorn Unicervical Uterus.

V. *Uterus septus* is a uterus normal in shape and generally in size, but internally divided into two cavities by a partition. This partition may be complete, extending from the external os to the fun-

Fig. 100.

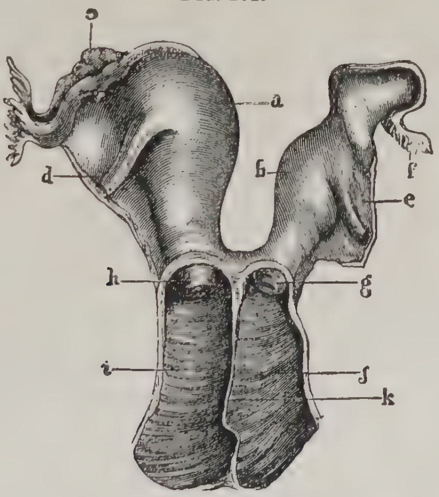


Uterus Septus: *aa*, tubes; *bb*, fundus uteri; *ccc*, septum; *dd*, the cavities of the two uteri; *ee*, internal os; *ff*, external wall of the two cervices; *gg*, external orifice; *hh*, vaginæ.

dus, or may be incomplete and only extend part of the way. In this anomaly the ducts of Müller have coalesced, but the partition-wall has not been absorbed. Blackwood recorded a case in which menstruation occurred alternately from either side. This abnormality interferes very little with pregnancy, but if the placenta is attached to the thin partition-wall, profuse hemorrhage may occur. Ruge recently split the partition-wall in a woman who had miscarried twice, and in the third pregnancy she was delivered at term.

VI. *Uterus duplex or Didelphys.*—The development of two complete and independent uteri, with no partition-wall and no adhesions. Mayrhofer claims that this anomaly can only occur with changes that would render life impossible, and so thinks that cases reported as duplex are only cases of septus.

Fig. 101.



Didelphic Uterus and Divided Vagina: *a*, right segment; *b*, left segment; c, *d*, right ovary and round ligament; *f*, *e*, left ovary and round ligament; *g*, *j*, left cervix and vagina; *k*, vaginal septum; *h*, *i*, right cervix and vagina.

In Olliver's interesting case the autopsy showed two distinct uteri, separated by folds of the intestines from each other; and Olliver quotes Bonnet as having had the same sort of a case. Heitzmann's case was similar to this, with the additional fact that not only the bodies of the two uteri, but also the two cervices, were widely separated. In all these cases there was but one set of appendages to each uterus, and but one broad and lateral ligament.

Winckel and Cassau have reported similar cases, and Schroder one in which the rectum was between the two uteri. Menstruation has been in these cases normal. Satschowa reports a case where both cavities were gravid at the same time.

VII. *Abnormalities of the cervix uteri* are common both in the size and shape of the canal and the external os, and in the size and shape of the cervix itself. These are well described by Courty in his work on the uterus, ovaries, and tubes. Winckel and Heitzmann have recorded cases of a double os uteri, or a normal uterus and cervix with the external os divided into two parts by an unabsorbed partition. Borner describes a case of his own of complication of the cervical cavity, which appeared at first sight like a cervix within a cervix, and quotes a case of Breisky's at Berne which was of the same kind. Borner was the first to describe this anomaly, and considers it extremely rare.

VIII. *Abnormality of position* is caused probably by the insufficient development of one of the Müllerian ducts, although united to its opposite duct; again, there may be a difference in the position of the two Müller's ducts, one being lower than the other, so that the fundus when developed is bent to the right or left as the case may be, or even twisted upon itself.

Kussmaul found this malposition in an autopsy upon a child, and in his case, one of the lateral ligaments was abnormally short. Fetal inflammations may play their part in these abnormalities. Sterility generally is present in these cases.

The Abnormalities of the Fallopian Tubes.—The entire absence of the Fallopian tubes rarely occurs, Courty says, even when the uterus is entirely absent. In cases of uterus unicornis, both the tube and ovary are lacking on the undeveloped side. Winckel, in postmortem examination of 500 female bodies, found the tubes to be of unequal length in 25; in 3 cases the tubes were from 4½ to 5 inches long; and in 2 cases he found accessory tubal ostia. Klob and Rokitansky have called attention to the differences in form of the ends of the tubes, and described supplementary openings that sometimes occur at or near the ends. Hennig described three cases of accessory tubes, and Bandl reported a case in which the tube was normally developed, but imperforated. Congenital abnormalities of position and development of the uterus naturally give rise to abnormalities of position of the tubes, and congenital hernias of the ovaries carry the tubes with them as a rule. Olshausen says: "In some, the Fallopian tube is defective, and its internal extremity is alone developed; its abdominal extremity is destitute of fimbria and obliterated." Keppler describes a supernumerary tube with a corresponding third ovary, that occurred in one of his cases.

Ovarian Anomalies.—Congenital absence of both ovaries, like absence of both tubes, probably occurs only in non-viable monstrosities, according to Olshausen, and reported cases in individuals cannot be considered authentic, since torsion and constriction may cause such marked atrophy as to leave little, if any, vestiges of the once-present ovary. Rokitansky demonstrated this condition in several of his cases. Absence of one ovary only occurs in cases of uterus unicornis. Grohe first reported a case of supernumerary ovary, and mentions a second case described by Klebs where the constriction of a band cut the ovary into two halves, each containing Graafian follicles in a rudimentary state.

Sinety's autopsy on a new-born babe showed six appendages to one of the ovaries: one of these appendages showed normal ovarian structure, while the rest were cystic.

Keppler, as mentioned before, found a third ovary and tube in one of his cases. Kochs, Lumniczer, and Winckel describe similar cases. Beigel found appendages to normal ovaries containing ovarian tissue 8 times in 350 post-mortems, and Winckel 18 times in 500 autopsies. Waldeyer found 6 in one ovary. These extra ovaries are generally bilateral; their peculiar feature is their imperfect development. Klebs declares that ovaries, in which germinal epithelium projects into the stroma, with separation of these tubes from the surface epithelium, without the development of follicles and ova, are similar in many ways and in appearance to testicles.

GENITAL TUBERCULOSIS.

Genital tuberculosis in the female may exist as a primary affection, although in the great majority of cases it is secondary to tubercular disease elsewhere. As a primary affection it has been found in from 5 to 15 per cent. of cases. J. Whitbridge Williams collected statistics showing genital tuberculosis in from 1 to 8½ per cent. of autopsies on phthisical women, and in 1 of every 12 abdominal sections for inflammatory disease. Cohabitation with one affected with tuberculosis of the genital, urinal, or intestinal tract may be the cause. Inoculation may occur by means of an instrument, finger, clothing, or other foreign body contaminated with the germs. It seems possible that the tubercle bacilli may enter the blood and obtain their first foothold in the diseased genital organs.

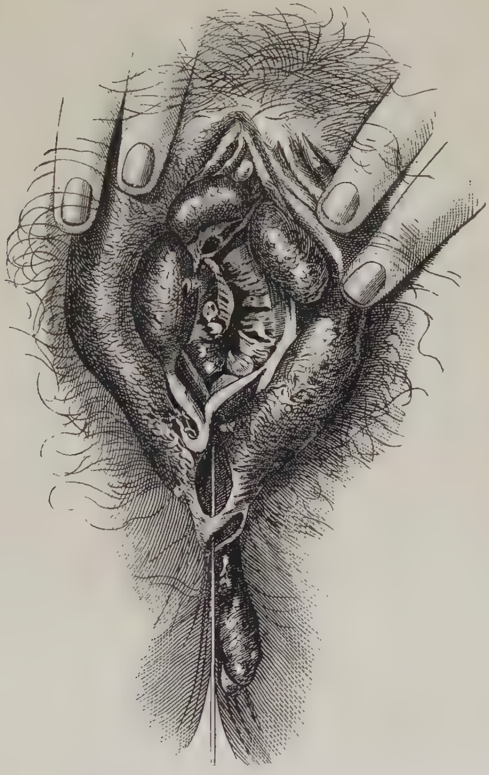
As a secondary affection genital tuberculosis may be caused by excursions of the germs from distant parts, through the blood- or lymph-channels; by direct extension, as from the peritoneum, intestines, or urinary organs; or by auto-inoculation through the infected urinary, alvine, pulmonary, or other excretions and discharges.

Tuberculosis of the Vulva.

Primary tuberculosis of the vulva is almost necessarily a skin affection, and occurs only in the form of lupus, unless we except those cases of coincident vaginal and vulval ulceration observed by Deschamps, Chiari, and Zweigenbaum. In these cases the disease was probably of vaginal origin, and not a true tuberculosis of the vulva.

Lupus begins on the cutaneous portions of the vulva in the form of hard masses, of a dark-red, livid color, imbedded in indurated skin. Sometimes there will be one large mass, sometimes a more diffused infiltration with several masses. On the dull-red or yellowish-brown surface or surfaces, brighter red, projecting tubercles appear, which in a few weeks or months commence to ulcerate and exude a serous fluid. When there is but a single mass, the whole surface assumes the appearance of a raised, unhealthy ulcer, while, in the diffuse variety, the ulcers may be separated. The base is hard and does not usually bleed easily, and is composed of friable, unhealthy-looking granulation-tissue. As the disease spreads it takes in more and more of the skin, and finally invades the lymphatic glands and internal organs. The course is usually slow, extending over years, and in old cases is often accompanied by cicatricial contraction in places, thus producing more or less deformity. The general health does not, at first, suffer, but the disease, after lasting several years, usually ends fatally.

Fig. 102.

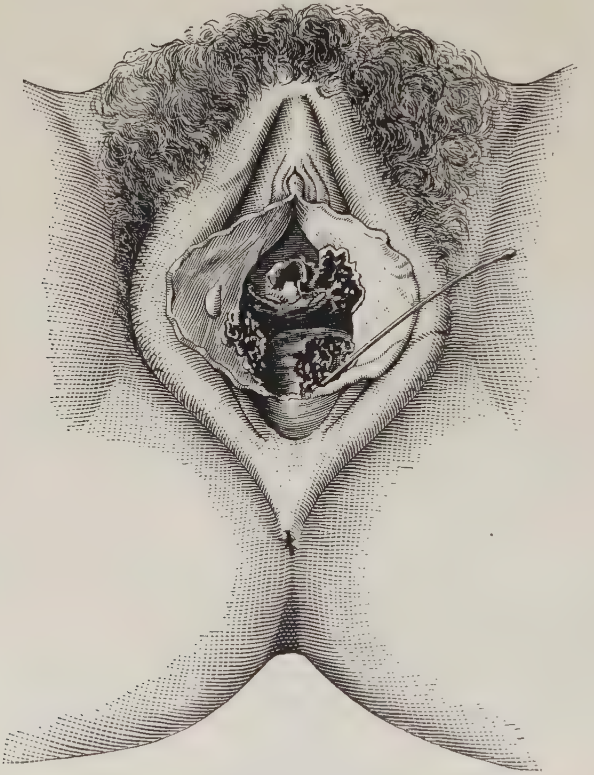


Lupus hypertrophicus et perforans of the Vulva.

The DIAGNOSIS presents no real difficulty, for its slow development and chronicity distinguish it from cancer and malignant disease, while the ulcerative characteristics differentiate it from elephantiasis.

The TREATMENT should always be radical. When possible, the diseased parts should be extirpated. When not, a thorough curetting with a sharp instrument, followed by a disinfection of the wound with strong acid, may be tried and repeated as often as the disease returns. Free incisions or linear scarifications favor cicatrization and healing. Deep cauterization by means of electro-puncture is the most satisfactory way of treating many cases, for all parts of the diseased tissue can thus be reached and cicatrization secured. The treatment must be repeated as fast as the disease recurs or redevelops, until all foci are finally destroyed.

Fig. 103.



Lupus of the Vulva.

Tuberculosis of the Vagina.

Tuberculosis of the vagina is usually secondary, although a few cases have been observed in which no other foci of the disease could be discovered.

It commences in the form of miliary tubercles, which in time break down and form irregular, flat ulcers with sharply-defined edges and a depressed grayish or yellowish-gray base, studded with granulations and covered by caseous matter. An area of hyperemia more or less filled with miliary tubercles usually surrounds the ulcer.

Tubercular fistula may result either from the vaginal ulceration extending into the connective tissue, and thence into the rectum, bladder or perineum, or from perforating rectal or vesical ulcers. We have been able to trace one fistula to ulceration of the Fallopian tube into the connective tissue and out at the skin over the perineum.

The usual seat of vaginal tuberculosis is in the posterior fornix, which probably becomes infected by the uterine secretions. It has been found that peritoneal or tubal tuberculosis may, either of them, infect the vagina without infecting the intervening structures, although in the majority of cases the uterus also becomes infected.

When the poison is introduced from without, the lower portion of the vagina may become first attacked.

The vaginal epithelium resists the invasion of tubercle bacilli until it becomes injured or abraded by trauma or the presence of irritating fluids or secretions.

The character of the ulceration and the fact that miliary tubercles in the vaginal walls are almost invariably connected with tuberculosis elsewhere, will prevent them becoming mistaken for granular vaginitis. Chancres may be mistaken for tuberculous ulceration of the vagina, but the clinical history and course of the disease soon clear up all doubt. A microscopic examination may sometimes be required to differentiate between it and carcinoma.

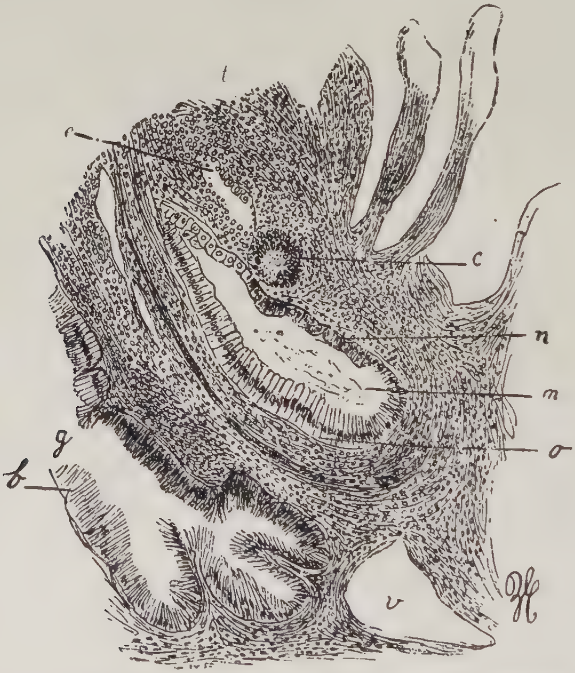
The TREATMENT should be as radical as possible when the vagina alone is affected. Excision of the diseased part and cautery of the wound should be done whenever practicable; otherwise, curetting and cautery. When, however, as is usually the case, the uterus and Fallopian tubes are affected and radical measures give no hope of prolonging life, palliative treatment only will be indicated, such as astringent and antiseptic vaginal douches, local applications to improve the character of the ulcerations, incisions, and cleaning of fistulæ, general tonics, etc.

TUBERCULOSIS OF THE CERVIX UTERI.

But few cases of tuberculosis of the cervix alone have been observed. The cases are also rare in which the body of the uterus is at the same time affected, the majority of cases being found in connection with tuberculosis of the vagina.

It occurs in the form of miliary tubercles, ulceration, or a combination of both. It is supposed that the mucous membrane of the cervical cavity, which does not have the protecting pavement epithelium of the vaginal portion and vagina, can become infected without having a previous lesion. The first stage is one of catarrhal inflammation, with the presence of small tubercles under the mucous membrane, usually too small for recognition clinically. As the disease advances the cervix enlarges, and ulceration similar to that of the vagina may appear. Small-celled infiltration of the connective tissue with the characteristic giant-cells, secondary villosities on the folds of the arbor vitæ, and enlarged glandular cavities are found.

FIG. 104.



Tuberculosis of the Cervix Uteri: *g*, papillæ and superficial vegetation; *t*, connective tissue containing many round cells; *e*, fissure in tuberculous tissue, in which may be seen epithelioid cells belonging to a tubercular follicle; *c*, giant-cells; *n*, epithelial covering of a gland near a tubercular follicle, showing large epithelial cells; *o*, epithelial layer formed of elongated cells; *m*, mucus contained in the gland; *b*, greatly elongated epithelial cells of a gland; *v*, vessel.

In case of development upon the vaginal portion, the granulations are for a time covered by normal layers of epithelium, the disease develops in the submucous connective tissue, and even extends slightly into the muscular layer.

The DIAGNOSIS is based upon the presence of tuberculosis elsewhere, the severe grade of the cervical endometritis, the infiltration of the cervix, the characteristic ulcerations (similar to those on the vagina), grumous discharge, and the microscopic examination of the secretions and tissue, with or without the discovery of the tubercle bacilli. Tubercle bacilli are not always found in the secretions, but the nature of the infection can be proven by inoculation into the peritoneal cavity of a guinea-pig.

The TREATMENT, in the beginning, calls for a high amputation of the cervix—after extensive infiltration, for a vaginal hysterectomy, provided, of course, other of the genital organs are not also affected. When extirpation is no longer possible, palliative treatment, such as recommended above for vaginal tuberculosis, must be depended upon.

TUBERCULOSIS OF THE UTERUS.

Tuberculosis of the uterus seldom occurs except in connection with tuberculosis of other parts. It is, however, not a rare complication of general tuberculosis, and is frequently found in connection with tuberculous disease of the Fallopian tubes. It has been found in about two-thirds of all cases of genital tuberculosis. Like cancer of the uterus, it seldom extends below the internal os. The puerperal state predisposes to its development.

Three forms are given: 1, miliary tuberculosis, with or without the formation of ulcerations; 2, chronic diffuse tuberculosis (caseous endometritis); 3, chronic fibroid tuberculosis. As, however, the first variety occurs only as a manifestation of general tuberculosis or as the initial stage of diffuse tuberculosis of the uterus, without any definite clinical history separate from the general infection, and, as the third variety has not been recognized, except on the post-mortem table, we will limit ourselves to the consideration of chronic tuberculosis or caseous endometritis.

This form commences as a deposit or deposits of miliary tubercles in the mucous membrane just underneath the epithelium, with areas of inflammation over them. Microscopic examination of these areas shows a development of giant-cells, often containing bacilli. As the disease develops the epithelium is destroyed, and ulcers are formed with a caseous or necrotic base and surrounding infiltration of leucocytes. In time those areas increase and unite, and the entire endometrium as far as, but not beyond, the internal os becomes the seat of caseous inflammation. The mucous membrane is infiltrated with small cells and destroyed, so as to be represented by a yellowish, caseous coating covering an ulcerated surface, studded with typical tuberculous nodules. The muscular tissue becomes hypertrophied, and at last extensively infiltrated, so as to destroy the firmness and resisting power of the uterine walls. When accompanied with stenosis of the cervical canal pyometra may result.

The SYMPTOMS are first those of ordinary endometritis, with more or less thickening of the uterine walls. The discharge, as the disease advances, contains cheesy matter that can often be recognized by the naked eye. The disease is chronic, and often associated with the symptoms of general tuberculosis.

The DIAGNOSIS in the beginning may be difficult. The symptoms of chronic endometritis with a grumous discharge, thickened and enlarged uterus, salpingitis, and perhaps chronic peritonitis, should lead us to suspect the disease. The discovery of tubercles in any part of the system adds to the probability.

A positive diagnosis, however, is usually made, only by a microscopical examination of the discharge or of the débris obtained by curetting. Tubercle bacilli should be sought for, but cannot always be found. Inoculation into the peritoneal cavity of guinea-pigs should give results inside of two weeks. Sterilized glycerin jelly may be infected by the mucus.

According to Paul Petit, the following characteristics, discovered in the scrapings of the uterine cavity, prove the existence of tuberculosis: "Interstitial cells which are necrosed or atrophied in a diffuse manner or in well-defined lines; giant-cells in greater or less embryonal nodules, detached from the stroma, and apparently developed around the vessels, whose lumina may or may not be preserved; numerous flexible and dilated glands lined with epithelial cells, which are either readily elongated or which have undergone an epithelioid transformation."

TREATMENT.—If the uterus alone be affected, it should be removed through the vagina. If the tubes are affected, they may be removed by an abdominal section, and the uterine body amputated at the cervix at the same time. To remove adherent tuberculous appendages and the entire uterus from above would be a difficult operation in most instances. There are undoubtedly cases in which both the uterus and the tuberculous appendages can best be removed by vaginal section. Further experience will enlighten us on this subject.

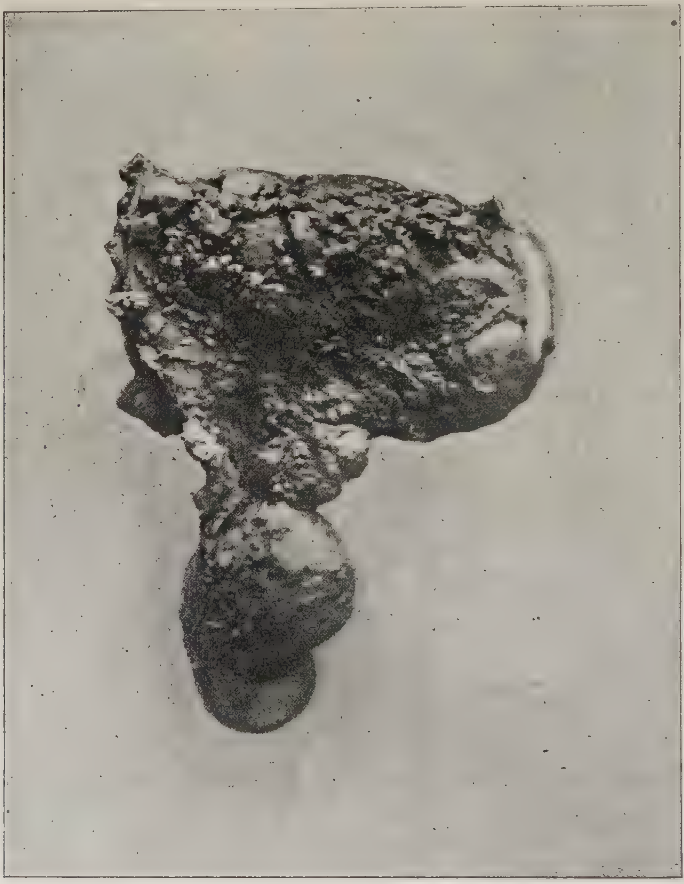
TUBERCULOSIS OF THE FALLOPIAN TUBES.

In the great majority of cases genital tuberculosis commences in the Fallopian tubes near or at their fimbriated extremity. In nearly all advanced cases the uterus, ovaries, or peritoneum, one or all, are likewise affected. Tuberculosis of the Fallopian tube may be primary, but it is, as a rule, secondary to peritoneal, intestinal, or a part of general tuberculosis. The frequency of this affection has only recently been brought to the attention of the profession, and many cases of salpingitis and pyosalpinx are turning out to be of tuberculous origin. The trouble, when better known, may prove to be quite a common one.

PATHOLOGICAL ANATOMY.—Tubal tuberculosis begins by the deposit, over a limited area or areas, of miliary tubercles immediately underneath the epithelium. At first these tubercles are not recognized by ordinary inspection, and often pass unnoticed when tubes thus affected are removed. As there are no symptoms of this stage, the condition is of greater scientific than practical interest.

Tuberculous salpingitis or chronic diffuse tuberculosis of the tube is the form usually diagnosed. In these cases the tubercles may or may not spread over the entire mucous membrane of the tube. The overlying epithelium is destroyed, and the mucous membrane about the tubercles is infiltrated with epithelial cells, more extensively near the fimbriated end, where the tubercles are most abundant. Coagulation-necrosis takes place in spots, and may involve the whole mucous membrane in the destructive process, so that the membrane may be represented, particularly at the fimbriated end, by a mass of caseous material, lying over granular ragged ulcers or directly upon the muscular structure. The disease develops slowly, and remains for a long time limited to the mucous membrane, but in time invades the muscular wall. The fimbriated end is apt to be closed, and the secretions have the appearance of a curdy pus, consisting of mucus, cheesy matter, with granular and epithelial débris, and, if there be mixed infection, also of pus. In old cases the pus-corpuscles may be entirely converted into granular matter, so that neither pus nor pus-germs can be discovered. As much as two quarts of puriform matter have been found in the dilated tube, but ordinarily the quantity is small, and may consist of only a little grumous fluid or of almost solid cheesy matter, which may be partly calcified. The tubal walls are thickened, and become attached by dense adhesions to the posterior surface of the broad ligaments, pelvic walls, omentum, and intestines. The adhesions and tuberculous deposits usually affect the ovary and surrounding peritoneum.

Fig. 105.



Tubercular Pyosalpinx with Tubercular Ovary.

The ordinary microscopic appearances of tuberculous tissue with inflammatory action, are usually present. In the folds of the mucous membrane are found giant-cells surrounded by round-cell infiltration, tuberculous follicles, degenerating cells, etc. Tubercle bacilli cannot always be detected. Williams describes a chronic fibroid tuberculosis of the tube. He says: "It differs from the other forms of tuberculosis in the excessive formation of fibrous tissue in and between the tubercles. Sections show the lumen greatly distorted and a few miliary tubercles scattered through the mucosa.

There may or may not be accompanying inflammatory changes, the main change consisting in the excessive development of fibrous tissue both within and without the tubercles and the relative absence of caseation. The marked feature of this form of tuberculosis appears to be its chronicity."

Symptoms and Diagnosis.—The symptoms are those of ordinary salpingitis, but with a somewhat different clinical history. We would suspect a salpingitis with extensive adhesions, afternoon temperature, and signs of progressive chronic peritonitis, in a delicate virgin, to be tuberculous. A tuberculous family history, or the discovery of the disease in the peritoneum or in any other part of the system, and the absence of any other apparent cause or known beginning of the disease, arouses suspicion of its tuberculous character. Encysted ascitic fluid extending high above the pubes indicates tuberculosis in the majority of cases. The ovaries are often coincidently affected, and give the usual signs and symptoms of chronic ovaritis. A salpingitis in an ordinary healthy woman with symptoms of pelvic inflammation dating from marriage, an abortion or confinement, with occasional acute attacks of pelvic peritonitis that subside so as to leave no temperature, which recur as the result of over-exertion or trauma, and which are retrogressive rather than progressive as long as the patient remains quiet, would be considered due to other causes than tuberculosis.

Prognosis.—The prognosis is similar to the prognosis of tuberculosis elsewhere. There is always a tendency to spread to the peritoneum, ovary, and uterus, and finally to a general infection and a fatal termination.

Treatment.—In cases of primary tuberculosis of the tubes they should be removed. When the disease is associated with tuberculosis elsewhere, except in the ovary and peritoneum, the operation should only be performed in case the complicating conditions are quiescent and the general condition of the patient good. Tuberculosis of the peritoneum, except in an advanced stage, is not a contraindication, since abdominal section often has a beneficial influence upon it.

Tuberculosis of the Ovary.

Primary tuberculosis of the ovary has not yet been described. In connection with tuberculosis of the Fallopian tubes and of the peritoneum it occurs frequently, more often with the former, but has been found in a few instances as a part of general infection, without participation of the other organs of generation.

It occurs in the form of miliary tubercles, caseous masses, or tuberculous abscesses. The miliary tubercles have usually been found on the surface of the ovary, and in connection with tubercular peritonitis, have been known to invade the walls of ovarian tumors.

The symptoms, diagnosis, prognosis, and treatment are inseparable from the tubal and peritoneal diseases with which they are associated.

TUBERCULOSIS OF THE PERITONEUM.

Tuberculosis of the peritoneum is met with in three varieties, viz:

1. *Miliary;*
2. *Fibroid;*
3. *Caseous.*

The pathology is similar to that of pulmonary tuberculosis; in fact, tuberculosis of the pleura is frequently associated with that of the peritoneum.

The infection may come directly from the blood or from infected viscera by way of the lymph-channels. Tuberculous ulceration of the bowels is undoubtedly a frequent cause. Tuberculosis of the Fallopian tube is found in more than one-third of the cases among women, and may be either the cause or the result.

Miliary Tuberculosis.

Miliary tuberculosis of the peritoneum may exist in a latent or an acute form. It may develop in a gradual, subacute manner without active symptoms or with none at all, and go on to the development of fibroid tuberculosis, and not be discovered until the peritoneal cavity is opened, on account of some other disease, either during life or post-mortem.

Acute miliary tuberculosis consists in a development of miliary tubercles in the layers of the peritoneum, with coexistent peritonitis. The peritoneum about the deposits may be slightly injected or of a raw-beef red color, with loss of the normal lustre. The tubercles may be confined to the intestinal coils and mesentery or may be found upon the parietal layer and omentum. Ascites of a deep yellow or bloody tinge, without adhesions, may be present, or adhesions may form and either limit or encapsulate the fluid. A fibrinous exudate is formed on the viscera after a time. The intestinal coils may become adherent to each other or to the parietal peritoneum. The omentum may be adherent to the abdominal walls or to the intestines, or to both. The adhesions are usually frail and bleed freely upon being separated, although the bleeding, which is capillary, soon stops. On account of the tendency to effusion the adhesions are not usually extensive. Tubercles may be found on some of the organs, such as the liver, spleen, or Fallopian tube.

SYMPTOMS.—The symptoms may develop suddenly or gradually. In the former case the patient enjoys pretty good health until overtaken by an attack of acute peritonitis. Prodroma, such as loss of appetite, disordered digestion, loss of flesh and strength, elevated afternoon and subnormal morning temperature, occasional abdominal pains, and perhaps tympanites, may not have been sufficient to attract attention.

Upon the supervention of the acute attack, the temperature goes up to 102° or 103° F. in the afternoon, usually with morning remissions, vomiting, and sometimes diarrhea, acute abdominal pains and tenderness, and tympanites. The symptoms usually subside in a few days, but not completely; some intestinal or gastric disorder, some afternoon temperature, some tenderness, and sometimes a little ascites, remain. Pleuritic pains with accelerated respiration may complicate the symptoms.

Usually this condition of partial cure remains for a while, and may be followed by a more or less complete recovery as far as the symptoms are concerned, or by other attacks, with development of the symptoms of caseous peritonitis, persistent gastric and intestinal disturbance, emaciation, and the usual general symptoms of advanced stages of tuberculosis.

In case the disease develops gradually, tympanites, abdominal pains and tenderness, afternoon elevation of temperature, indigestion, attacks of diarrhea, emaciation and weakness gradually become more pronounced and more persistent. The abdomen may be greatly distended and everywhere resonant, or may show evidences of ascites. These symptoms may at any time develop into an acute attack of general peritonitis, or gradually merge into the caseous variety, or exhaust the patient in the subacute stage.

Special symptoms are often observed that have reference to infection of the affected viscera. Thus we may have slight icterus, hepatic pain, and predominant gastric disturbance when the liver is affected; pain in the iliac regions, backache, leucorrhea, metrostaxis, hysteria, etc. when the sexual organs are invaded.

Pigmentation of the skin has been observed in many cases, particularly in those of slow development and in the caseous variety, and is considered of diagnostic value.

DIAGNOSIS.—The diagnosis is based upon the prodroma or the gradual onset of the local symptoms, the general emaciation, and the presence of tuberculosis elsewhere in the system, particularly in the Fallopian tubes, pleura or lungs, and upon the presence later of ascites. The ascites is very prone to take on the appearance to the naked eye of an ovarian cyst; in other words, the bulging in the flanks, as occurs in other varieties of ascites, is oftentimes entirely absent, but in its place the abdomen is distended into a globular shape, as in cystic disease. This is of considerable practical value from a diagnostic point of view.

PROGNOSIS.—The prognosis of miliary peritoneal tuberculosis is probably more favorable than that of any other form. Many patients get well under good hygienic surroundings and appropriate treatment, while others are apparently cured by an operation.

TREATMENT.—The general treatment is similar to the treatment of tuberculosis elsewhere. Tonics, remedies for the relief of gastro-intestinal irritation, rest, massage, a carefully-regulated diet, digestives, creasote, counter-irritants, often lead to a cure of the peritonitis, and a practical cure of the tuberculosis through fibroid degeneration.

When ascites has resulted, or when miliary tuberculosis exists without extensive adhesions, an abdominal incision, with evacuation of the fluid if present, and the admission of air into the peritoneal cavity, are often followed by a cure.

Whether light and the dryness attending the removal of the fluid cause the improvement, or the removal of the ptomaïnes of the bacilli with the ascites, or the subsidence of the inflammation which favors the development of the germs, or the mere evacuation of the fluid with its embarrassing action upon the peritoneum and intestinal muscularis, is difficult to determine. We should say that the removal of the fluid would be one factor in those cases in which ascites is present. This undoubtedly relieves mechanical embarrassment, removes some irritant products, and leaves the peritoneal absorbents in a better condition to remove the products of inflammation, and thus favors fibroid changes. The admission of air would also act as a stimulant to the circulation. It must be remembered that many of the cases would have recovered without the operation, and also that the care after abdominal sections must do much to relieve the peritoneal irritation and inflammation.

The question of drainage after such an operation is an open one. If there be but little ascites and no adhesions have been separated, drainage can hardly be of use. Considerable ascites of rapid formation or oozing from separated adhesions would, on the contrary, require it.

In long-standing cases, with fibrinous flakes and some gelatinous fluid that may have been encapsuled about diseased organs, the peritoneal cavity should be douched out with a normal saline solution (0.6 per cent.). This condition, however, belongs more often to the caseous variety.

Fibroid Tuberculosis.

As miliary tuberculosis represents the first stage, so fibroid tuberculosis represents the last stage, of the disease. We refer, of course, to those cases that do not terminate in caseation and ulceration, and which will be considered hereafter.

The condition usually found is that of old, firm visceral and parietal adhesions and fibrous bands of greater or less extent, with hard nodules, sometimes whitish, but more often pigmented, from 1 to 3 mm. in diameter, and situated either on the surface of the peritoneum, in the mensentery, omentum, or in the fibrous bands. Although tubercle bacilli may be found in them, there is a scarcity of tubercle cellular tissue and an abundance of fibrous tissue. The matting together of intestines, omentum, and other viscera may give rise to localized resistant masses that can be felt through the abdominal walls.

Symptoms.—Oftentimes there are no symptoms except those referable to a previous stage, and which may have been overlooked or misinterpreted.

The usual symptoms are, more or less abdominal distension and tenderness, constipation, gastric or intestinal indigestion, emaciation, localized pains, and evidences of present or past tuberculosis in the lungs, pelvic organs, or elsewhere. The tenderness is not so great but that a careful palpation of the abdomen may be made. The temperature may be subnormal for weeks at a time, or, if there be much disturbance in the abdomen, may rise to 100° or even 102° F. in the afternoon, and fall to 97° or 98° F. in the early morning hours. Night-sweats are not usually persistent, if indeed present, unless there be also some more active form of the disease in the system. In many cases, however, the symptoms are complicated by tuberculosis of other parts, and the patient usually dies of general or pulmonary tuberculosis, rather than peritoneal. In many cases the local and general condition improves, the symptoms subside, and the patient recovers, and may remain in quite good health until a new development of the disease, either in the abdomen or elsewhere, takes place.

DIAGNOSIS.—The diagnosis is based upon the symptoms already given, upon the mild character of the disease, and the tendency to improve, instead of growing gradually worse, as in other kinds of tuberculosis of the abdomen. An indefinite resonant tumor or tumefaction of chronic character is sometimes found, unaccompanied by ascites. Exudates connected with appendicitis and septic salpingitis are differentiated by the characteristic acute symptoms that precede them. The presence of tuberculosis elsewhere would lead us to suspect the true nature of the affection.

PROGNOSIS.—The prognosis is often favorable as far as the local condition is concerned. The chief danger lies in the presence of the tubercle bacilli in the system, leading to development of tuberculous inflammation elsewhere or in other portions of the abdominal cavity. Many cases, however, recover without recurrence.

TREATMENT.—The treatment consists mainly in promoting the curative process that is already going on. If there be but few symptoms, ordinary hygienic management, tonics, change of occupation, etc. will be sufficient. Gastro-intestinal derangement, abdominal tenderness, tympanites, and emaciation call for more careful treatment. The irritability of the stomach should be relieved by appropriate remedies, the bowels regulated, and an abundance of easily-digested food given. If there be much abdominal tenderness and tympany, the patient should be kept quiet, the circulation and nutrition maintained by massage and large quantities of good milk and cod-liver oil. Counter-irritation over the abdomen and electricity in moderate dosage may have some beneficial influence.

When the symptoms subside, active outdoor exercise and the ordinary general treatment for tuberculosis should be recommended. Creasote *per orem* and *per rectum* may be tried, as in cases of pulmonary tuberculosis.

Caseous Tuberculosis.

The caseous or ulcerative form of peritoneal tuberculosis gives rise to a variety of conditions. The parietal, visceral, and omental peritoneum and subperitoneal glandular structure may be the seat of degenerating tubercles. In some cases all the abdominal viscera are agglutinated by caseous tubercular substance and false membranes. Sometimes the adhesions include one or more small accumulations of yellowish, reddish, or brownish serum of variable density, containing flakes of lymph-granular débris, and not infrequently pus and blood-corpuscles and tubercle bacilli, or the entire fluid may be puriform, or one accumulation may be serous and the other purulent. Pus-collections between and over agglutinated intestines or viscera may, by ulceration, give rise to intervisceral or external fistulæ. Thus in children, umbilical fistulæ have often been recorded; in the pelvic tuberculosis of women, rectal fistulæ; while, after operation and upon the post-mortem table, viscero-abdominal or intervisceral fistulæ. More often this cheesy infiltration and agglutination of viscera is localized, in some part or parts of the abdominal cavity, forming a tumor-like mass. Occasionally general ascites coexists with localized deposits, but more often there is either none or there is one large, encysted accumulation, surrounded by a capsule of thickened and infected peritoneum and adherent intestines. Local abscesses may burrow through adhesions or in connective tissue for a long distance, and become surrounded by a large area of induration before finding an outlet.

Among the favorite places for this variety of peritoneal tuberculosis to show itself, are, about the liver, the cæcum, the omentum, and the uterine appendages.

The peritonitis about the liver is always secondary to cheesy tuberculosis of the liver, and is a very rare affection.

Agglutination of the intestines about the cæcum, with cheesy deposits and abscess, that burrow across the abdomen, or upward or downward, or discharge into the rectum, has been frequently met with. Some of the cases described have probably been old cases of appendicitis either with or without secondary infection by the tubercle bacilli.

Tuberculosis sometimes attacks the omentum, particularly in children, and may retract and roll that membrane in the shape of a hard tumor extending across the upper abdomen, or may go on to abscess-formation, and either ulcerate externally at the umbilicus or into an intestine, or both.

Pelvic peritoneal tuberculosis in women is usually connected with tuberculous salpingitis. The peritonitis, if extensive, generally assumes the encysted form, one large cyst reaching up into the abdominal region, sometimes to the umbilicus, and almost entirely across, with occasionally one or two small separate sacs in the recto-uterine pouch and under the appendages. In these cases the appendages and the surrounding exudate form a hard mass that extends from the uterine horns to the sides of the pelvis. The solidified appendages, the uterus, upper part of the bladder, pelvic walls, lower anterior abdominal wall and adherent intestines are covered by a thick, friable, grayish, or yellowish peritoneal exudate, that can usually be readily separated from the intestines superiorly, but which often adheres firmly to the parts in the pelvis. Tubercle bacilli are frequently found in the tubes, and signs of tuberculosis may exist elsewhere in the system.

SYMPTOMS AND COURSE.—Caseous tuberculosis of the peritoneum usually gives the history of repeated attacks of peritonitis, which may have been recognized as such or may have been mistaken for gastric or intestinal disorders, typhoid fever, pyosalpinx, appendicitis, etc. Between these attacks the symptoms may subside and the temperature remain subnormal, particularly in the early morning, for weeks at a time, and but little discomfort be felt. Usually, however, there is an afternoon rise of temperature to 100° or 101° F., some tympany and abdominal tenderness, and occasional pain in the intestines or pelvis. At the same time the appetite is impaired, and the bowels either obstinately constipated or alternately relaxed and constipated, with attendant loss of flesh. In more advanced cases there may be occasional or persistent vomiting or diarrhea, great abdominal distension from intestinal gases or ascites, or both together, with marasmus and night-sweats. Obstruction of the bowels has been noted in a few cases. Pleurisy is not a rare complication, and pulmonary tuberculosis will be detected in most cases before the fatal termination.

In some cases the nutrition is but little impaired, and only the signs of local inflammatory action of the uterine appendages or over some other circumscribed area are to be found.

DIAGNOSIS.—The condition of the patient often simulates that of typhoid fever when the tubercles are localized about the cæcum. The previous history of abdominal symptoms, the absence of the typhoid eruption, the preceding prolonged record of a moderate afternoon rise in temperature, palpable induration about the cæcum, and its occasional extension out from the iliac region, tuberculosis elsewhere, and the continuance of symptoms after the first three or four weeks, with perhaps a family history of tuberculosis, will generally help us to arrive at a definite diagnosis, although in obscure cases considerable time may elapse before the differences can be made out.

Appendicitis has a history of short localized acute attacks with complete intermissions, while the preceding acute attacks of tuberculosis, if severe, are less localized, or, if not severe, are of a more remittent character. Extensive tympanites, pronounced derangement of the intestinal secretions, and the emaciation and general symptoms of the tuberculous condition are not usually noticed in appendicitis. A mild attack with a moderate rise of temperature for a few days, and then a sudden lighting up of general peritonitis, is characteristic of appendicitis, as is also the localization of the exudate and tenderness near the anterior superior spine of the ilium, on a line extending from the spine to the umbilicus.

The local signs may be confounded with malignant, or even benign, abdominal growths, but the general symptoms will usually enable us to decide in favor of tuberculosis.

Peritonitis accompanying septic salpingitis shows more decided regressions, improves more by rest in bed, and has a history that points to its septic origin.

Encysted tubercular peritonitis, particularly that form connected with tubercular salpingitis, may simulate an ovarian cyst. In the former case, however, we can detect the enlarged tubes *per vaginam*, and by the bimanual examination detect an intestinal tumor that is connected with the diseased appendages. The tumor as felt over the pubes is not so firm as an ovarian cyst and gives larger waves of fluctuation. The percussion note shades off gradually from dullness to resonance. The encysted fluid has not the definitely rounded outline of a single ovarian cyst. The afternoon rise of temperature, emaciation, and general signs of tuberculosis indicate the true nature of the infection.

Thin-walled parovarian cysts often give the same kind of wavy fluctuation, but they are of a definite rounded outline and not connected with indurated appendages. The percussion note becomes resonant more abruptly.

PROGNOSIS.—The prognosis is usually bad. The disease is no longer in the first stage, and tends to local disorganization and general infection. A few cases are cured by operation. After a fecal fistula has formed an early fatal result may be expected.

TREATMENT.—The medical treatment is similar to that already recommended for the other varieties, and can only be considered as palliative. The surgical treatment consists in the removal of peritoneal fluid by abdominal section with such affected parts (uterine appendages, omentum, etc.) as may be practical, and the separation of such adhesions as may be necessary to evacuate local fluid accumulations and relieve intestinal paralysis or obstructions.

The removal of the uterine appendages has already been referred to. The accompanying sacculated effusions should be removed so as to leave the cavity dry, and the false membrane sponged clean of all lymph and débris. Sometimes we may have to content ourselves with doing this, without disturbing the appendages. When the appendages are removed, the integrity of the sac is necessarily destroyed at its lower end, and it is then well to remove all of the sac that can be easily detached, for fear that it might undergo degenerative changes.

In the first case of this kind operated upon by the author, he left the entire sac, excepting the portion removed with the appendages, and had for a result a suppuration commencing on the ninth day. On the twenty-seventh day a counter-opening was made in the cul-de-sac of Douglas. About a week after that a fecal fistula formed. The patient died seven weeks after the operation, with the fistula still discharging pus and feces.

Profiting by this experience, the upper part of the sac was removed in the next case, leaving only a small, firmly adherent portion in the recto-uterine pouch, the drainage-tube being removed in fifty hours, and the patient cured. She is now, eighteen months after the operation, teaching school, and in better health than for years.

The next case had incipient pulmonary tuberculosis, with a history of acute attacks of pneumonia and pleurisy. In addition to a pint of sacculated peritoneal fluid, an abscess containing cheesy matter was found filling the recto-uterine and lateral peritoneal cul-de-sac. Both tubes contained cheesy pus. The left was so friable that the ligatures cut completely through and could not be reapplied. Removed all of the sac possible. Drainage-tube used for thirty hours. Recovery without a bad symptom.

When the disease is up among the intestines and the coils are firmly matted together, it is usually better not to separate them, for a fecal fistula may already have formed between them or may be produced by the operation. Drainage is necessary in most cases, but it should usually be made with a glass-tube and the tube taken out as soon as possible.

The good results of abdominal section even in caseous tuberculosis are sometimes surprising, and many cures are recorded. Instead of the general peritoneum becoming infected, the healthy membrane seems to help in curing the diseased portions.

DISEASES OF THE VULVA AND VAGINA.

Hypertrophy of the External Genitals.

The parts most frequently subject to hypertrophy, whether congenital or acquired, are the *nymphæ* or *labia minora.* In women, with liberal development of subcutaneous fat, the nymphæ are often entirely concealed by the labia majora. Ordinarily, they project far enough for the edges to be seen. Occasionally, however, they project like wings folded over the vestibule or unite over the clitoris to form an apron, or one or both may be divided into one, two, or more folds, forming double, triple, or even quadruple nymphæ; or one labium may be larger than the other; or they may extend down and unite in front of or behind the anus, and cover up the vestibule so completely as to cause great annoyance, and may even require an operation for their removal. Among the Bushmen and Hottentots the labia minora often become enormously developed, and hang like thick aprons down to the knees.

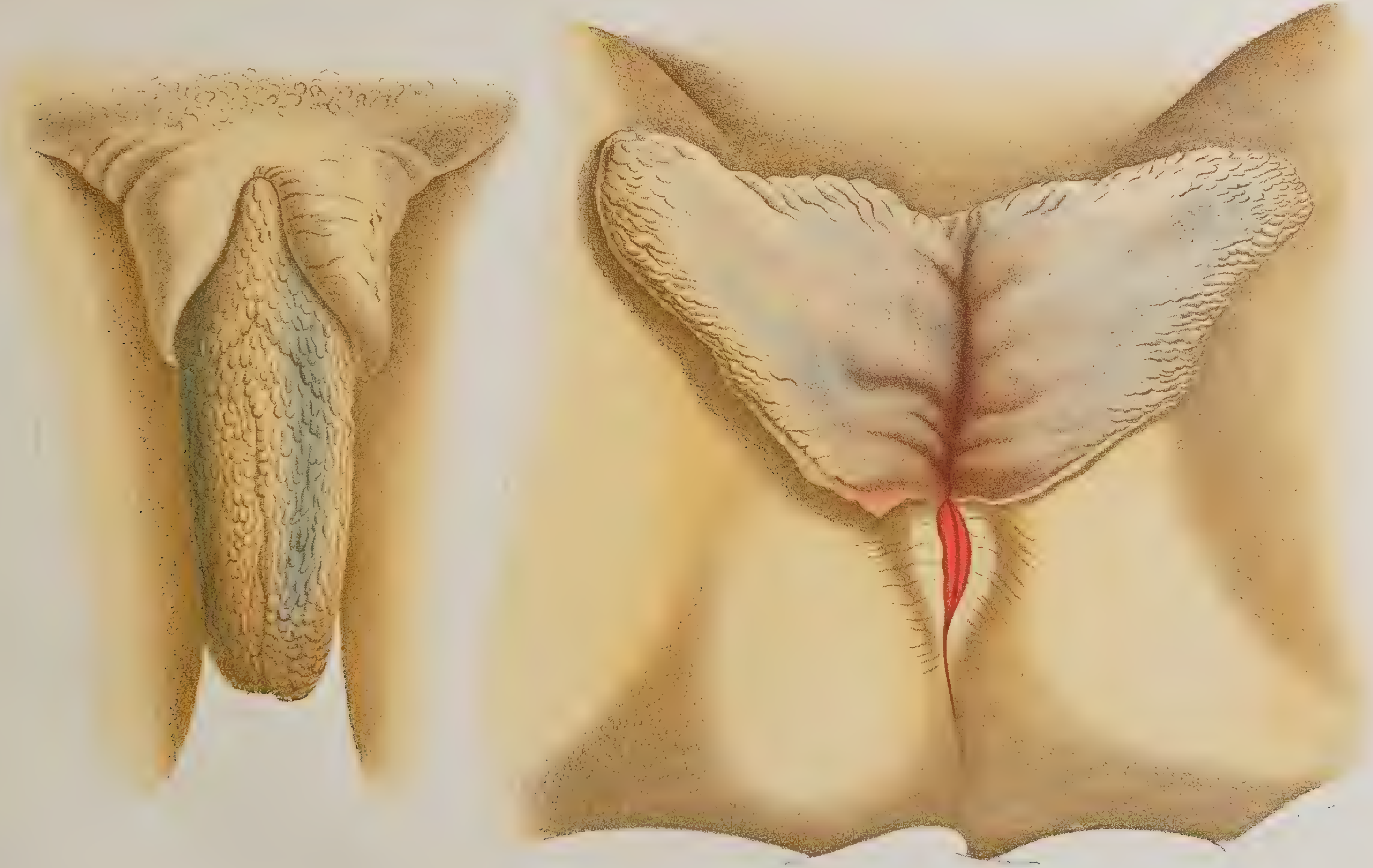
Inflammation may result in cases of hypertrophied nymphæ from the friction of walking, riding, or excessive venery. Sexual irritation undoubtedly causes enlargement and even hypertrophy, but should not be considered as the usual cause.

The remedy for these conditions consists in amputation and sewing up of the edges with fine catgut or, preferably, silkworm-gut.

The *labia majora* vary greatly in size in different women, sometimes projecting like cushions tightly pressed together, and sometimes consisting merely of loose folds of skin on either side of the exposed nymphæ. The latter condition is often found in very thin and in old women. Occasionally the labia will extend down so as to form a fold in front of the anus, and have even been known to surround the anus. A superabundance of labial fatty tissue not only conceals the labium minus, but sometimes seems to draw apart the folds that form the latter to such an extent as almost to obliterate them.

The *clitoris* is relatively larger in children than in adults, because

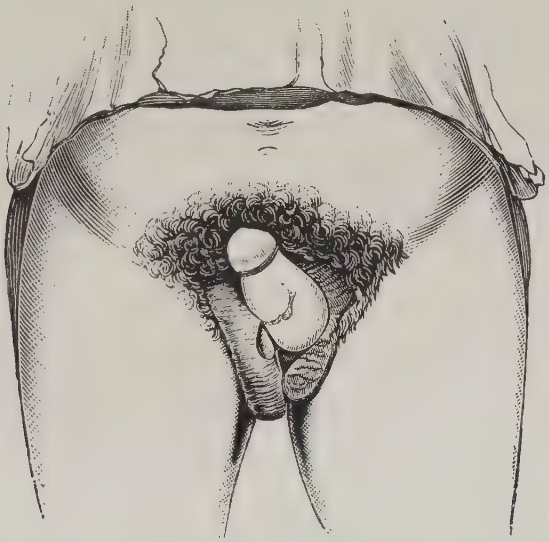
PLATE XIII.



Hypertrophy of Labia Minora (Hottentott Apron).

toward puberty the developing labia gradually project over and cover it. True hypertrophy of the clitoris is much less frequent than of the nymphæ. Occasionally, however, the clitoris is found to attain the size of a boy's penis, with powers of erection, and when accompanied by adhesion of the labia may conceal the sex. An amputation may become necessary, on account of the abnormal direction of the stream of urine, friction, excoriations, interference with coitus, etc., particularly when occasioning trouble in childhood.

Fig. 106.



Hypertrophy of the Clitoris.

Adhesions of the Labia.

Adhesion of the labia usually occurs in infancy and in childhood, and occasionally is found in adult life. It consists merely in an agglutination of the surfaces without loss of epithelium or organic union. Deficient hardening of the epithelium has been given as a cause, and comparison has been made with the adhesion of the prepuce to the glans in the male. Uncleanliness, irritating discharges, and mild forms of inflammation may lead to it.

It usually causes no symptoms, but may give rise to inconvenience by directing the urine upward. Later, menstrual fluid may be retained or may be expelled with difficulty. Coitus is usually interfered with, although not always. A woman in labor in whom the vagina could not be found, although the head was down upon the perineum, was recently observed. What at first seemed to be the vagina was an enormously dilated urethra, through which the finger easily and painlessly entered the bladder, and through which copulation had taken place. The occluding labial diaphragm was punctured a little below the urethra in the median line, the opening torn large enough to admit two or three fingers, and the advancing head accomplished the rest. The puerperium was normal, and the parts afterward regained their natural relationship.

In young children it is only necessary to separate the labia forcibly, and to keep the parts cleansed and lubricated for a few days to prevent an immediate recurrence. In older people the best way is to introduce a bent sound into the vagina, just under the urethra where a small opening can usually be found, and to tear the labia asunder from within outward by dragging the sound out between them. When such an opening cannot be found, and the parts are not separable by moderate force from without, menstruation may be awaited. The vagina will then become filled and the labia put upon the stretch by the retained fluid. The bladder should be emptied, a sound placed in it, a finger introduced into the rectum, and a bistoury trocar plunged into the fluid mass, in the median line, a little below the urethra. The opening should then be enlarged until the finger can enter the vagina, when the adherent labia are separated. Subsequent care prevents reunion.

Organic union of the labia, due to traumatism or ulcerative inflammation, has been known to take place and requires operative measures similar to the last mentioned. (See "Atresia of the Vagina.")

VULVITIS.

There are three varieties of vulvitis, or inflammation of the vulva—viz.: simple, purulent, and follicular.

Simple Vulvitis is generally caused by local irritation. Acrid vaginal discharges, dirt, accumulated secretions, dribbling urine, parasites, traumatism from scratching, friction, and masturbation are the most common causes.

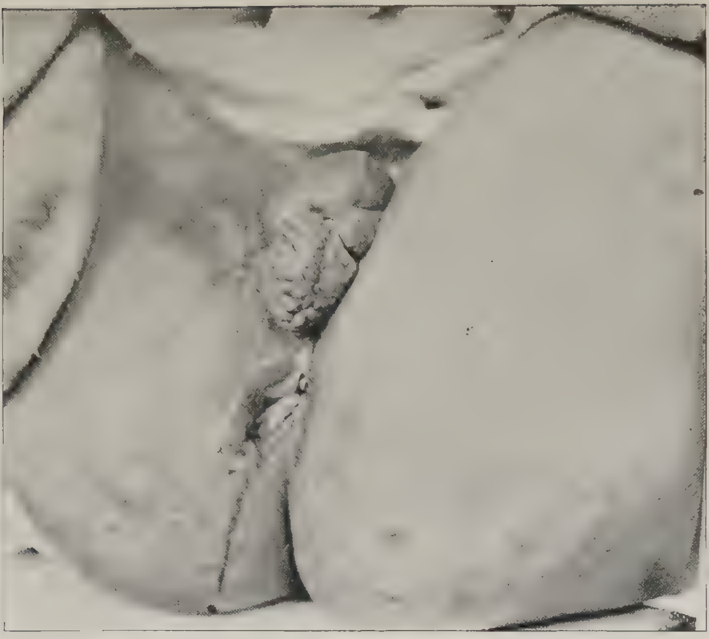
Increased redness, with more or less tumefaction, and watery or mucus discharges, are characteristic.

Burning pain, particularly upon the passage of urine, and persistent itching are the main symptoms.

The TREATMENT should be directed to the removal of the cause.

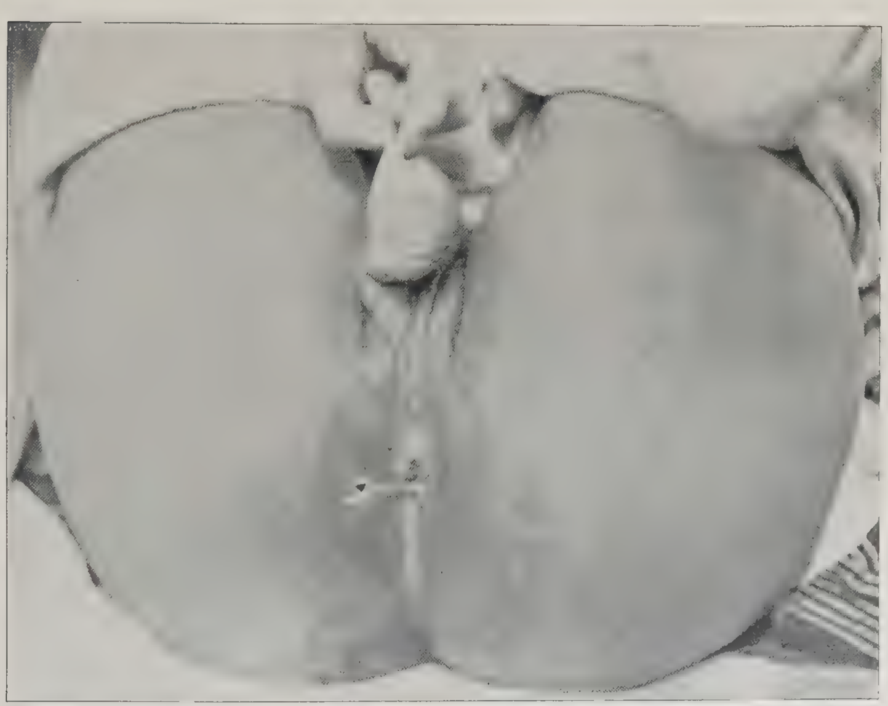
PLATE XIV.

FIG. 1.



Hypertrophy of Right Labum Majus. Fistula of Ischio-rectal Abscess, with Syphilitic Eruption on Buttocks.

FIG. 2.



The same. Labum suspended. Syphilitic Eruption faded, and Fistula contracted under specific treatment for two weeks.

Copious hot water, or ½ of 1 per cent. aqueous saline douches, 1 or 2 per cent. carbolated aqueous douches, or acetate of lead, a teaspoonful in one or two quarts of water, or a $\frac{1}{1000}$ or $\frac{1}{2000}$ solution of bichloride of mercury, are useful when acrid or fetid vaginal discharges are present. Lotions of acetate of lead, carbolic acid, or tannin should be used externally, and may be continuously applied on cloths, if the patient can be kept quiet. Or, the oxide-of-zinc ointment, to which 5 per cent. of carbolic acid or 2 per cent. of menthol is added, may be frequently applied, and often gives great comfort and relief. The milder applications should be used in the beginning of the attack ; the stronger in the advanced stages.

Purulent Vulvitis results from the same sources as simple vulvitis, and is often an advanced stage of the same. Gonorrheal infection is a frequent cause. Direct infection by septic matter may be the primary cause.

Redness, tumefaction, and a muco-purulent discharge are always present. In aggravated and neglected cases, eroded and ulcerated spots are found on the inner surfaces of the labia, and sometimes, excoriations on the inner surfaces of the thighs.

The SYMPTOMS are the same as in simple vulvitis, but intensified. A moderate degree of febrile reaction and restlessness at night are often noticeable in children thus affected.

Although the disease may pass over without treatment, it should not be forgotten that there is danger of progressive infection of the vagina, uterus, and Fallopian tubes.

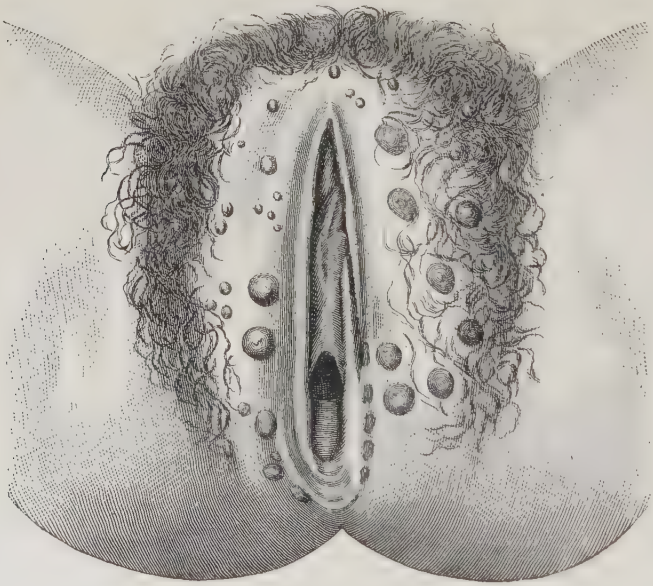
The TREATMENT must have special reference to the septic nature of the disease. All that would be necessary, in addition to such treatment as has been given for simple vulvitis, is to obtain and and maintain perfect cleanliness. This requires more care than is ordinarily understood by that term. If we could wash off the pus by constant irrigation with plain water, or ½ of 1 per cent. solution of chloride of sodium, or wash the parts every half hour or hour with a saturated solution of boracic acid, the pus-microbes would soon be exterminated, and a mild form of simple vulvitis established, or a perfect cure attained.

Warm sitz-baths in ½ or 1 per cent. saline solution, three or four times daily, are of great benefit in removing secretions. The parts should be bathed as nearly every hour as possible with the saline or boracic-acid solution until the tenderness has somewhat subsided, and then with a weak acetate-of-lead or tannic-acid solution, and the case treated the same as in simple vulvitis. Cloths wet in these solutions may be used at night instead of frequent washings. After the discharge is partly checked, dry pieces of absorbent cotton, soaked every hour or two and reapplied, after a mild astringent or antiseptic lotion has been used and the parts thoroughly dried, constitute the very best kind of dressing.

The stronger astringents and antiseptics, such as a 2 per cent. solution of nitrate of silver or a $\frac{1}{2000}$ solution of mercuric bichloride, are required only in neglected cases and those that cannot be frequently dressed. As the parts cannot be cared for as often in the night, the mercuric or silver solution may be advantageously used at bedtime.

Follicular Vulvitis is the name given to the inflammation of the glands of the vulva. Sometimes the sebaceous and piliferous glands are enlarged and project like minute papillary elevations upon the surface of the labia and prepuce. This enlargement of the separate glands is produced by the distension with mucus or muco-pus, which may be seen to exude from them. At other times there are no distinct elevations, and the inner surface of the vulva is covered by an offensive mucus or muco-purulent secretion.

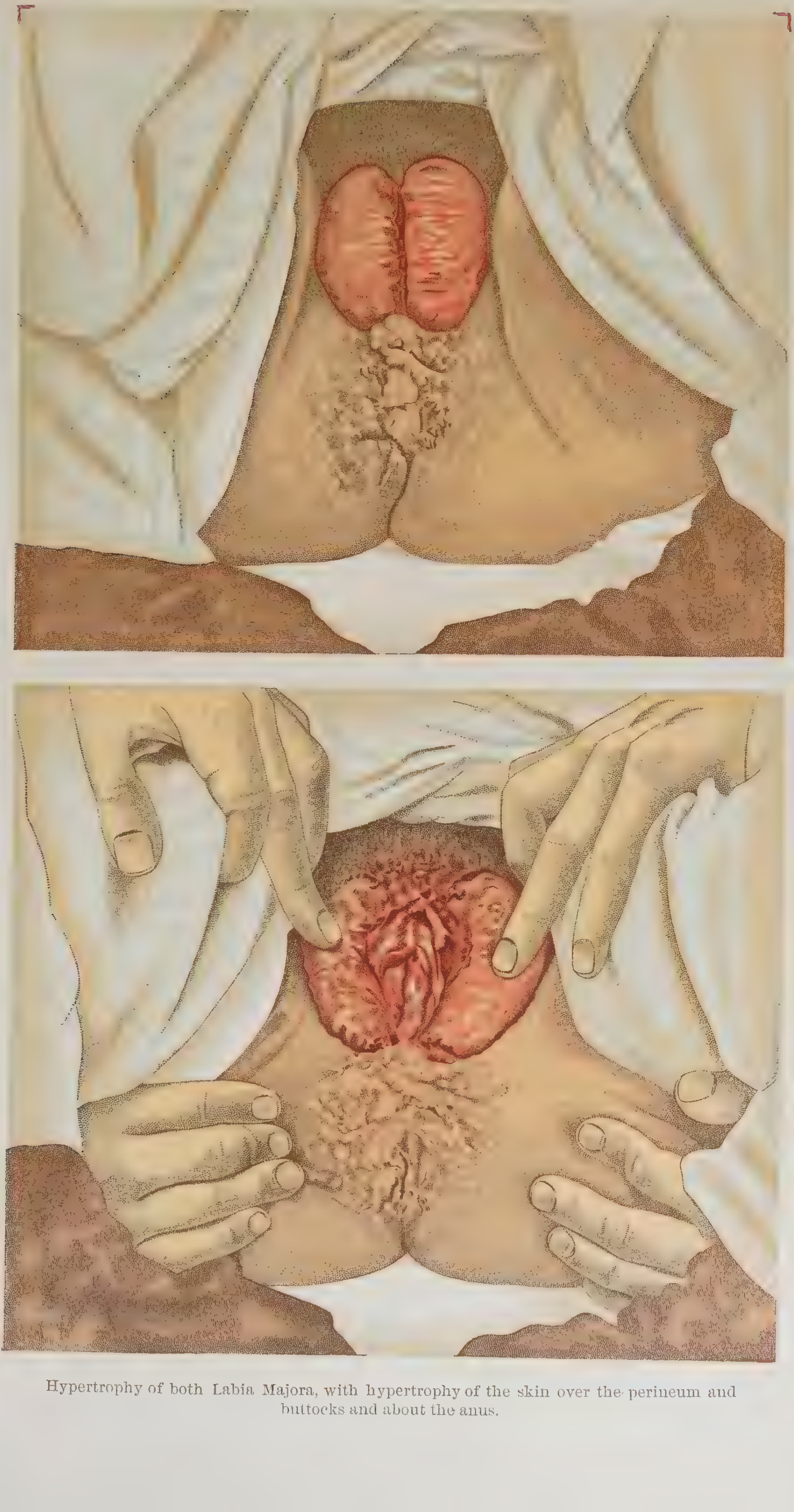
Fig. 107.



Follicular Vulvitis.

The CAUSES are: want of cleanliness, vaginal discharges, pregnancy, discharge from malignant disease, and a reduced state of vitality.

PLATE XV.



Hypertrophy of both Labia Majora, with hypertrophy of the skin over the perineum and buttocks and about the anus.

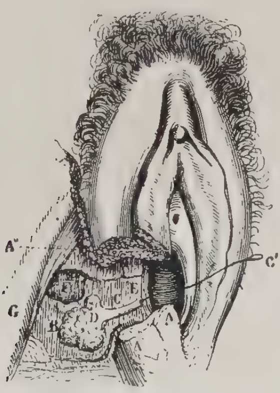
The SYMPTOMS differ but little from those of the other forms of vulvitis described above.

The TREATMENT in mild cases is similar to that of the simple and purulent forms. It is, however, more often necessary to use the nitrate-of-silver and corrosive-sublimate solutions. The emptying of the follicles is necessary to a cure, and may be promoted by alkaline fomentations, pressure by means of dry absorbent-cotton pads, manual pressure, or better by puncturing with a bistoury or a bayonet-pointed uterine scarificator. When thus evacuated nitrate-of-silver solution or tincture of iodine and glycerin, in equal parts, may be applied.

INFLAMMATION AND ABSCESS OF THE VULVO-VAGINAL GLANDS.

Purulent vulvitis or vaginitis is apt to infect the vulvo-vaginal or Bartholini's glands.

FIG. 108.



Normal Vulvo-vaginal Gland. The labium majus and minus, the sphincter vaginæ muscle, and the bulb have been partly removed on the right side in order to expose the gland: *AA*, section of labium majus and minus; *B*, gland; *C*, excretory duct; *C'*, stylet introduced into the duct; *D*, glandular end of duct; *E*, free end of duct; *F*, section of bulb; *G*, ascending ramus of ischium.

The SYMPTOMS are, swelling of the deeper tissues on the inside of the lower part of one or both labia, usually one at a time, with enlargement, and often a distinct globular tumor that may vary in size at different times, as the gland is filled up or has emptied itself. In most cases there is a small area of redness around the mouth of the gland, just in front of the hymen or its remains, halfway up the side. A muco-purulent secretion may exude or be squeezed out. In old cases the only symptom may be an occasional filling up of one of the glands with a corresponding globular tumor, deeply seated in the labium, which persists and gives rise to local pain for a few days, and then discharges more or less gradually, giving no more trouble for the time. In such cases there is but little, if any, surrounding induration.

The TREATMENT consists in the ordinary treatment for vulvitis, and in hot fomentations to relax the orifice and thus promote the discharge. If the tenderness be not too great, evacuation by gentle pressure may be attempted. Drainage by means of dilatation with a small probe may be adopted in obstinate cases of recurrent accumulation.

Abscess of the gland may result from retention of pus. In this case the lower outer part of the labium becomes indurated, and presents the ordinary characteristics of labial abscess. The pus may be evacuated into the cellular tissue of the labium and a labial abscess coexist.

Excision of the whole gland and surrounding abscesses, and sewing up of the parts by deep sutures will often effect an immediate cure. In case the parts cannot be excised, the secreting surface should be destroyed by a cautery, the surrounding pus-surfaces curetted, and the cavity packed with iodoform gauze and absorbent cotton until healed. The external incision should be a large one.

Labial Abscess has the same etiology and symptomatology as abscess in the subcutaneous connective tissue elsewhere. The labium becomes enlarged with a well-defined indurated mass, extending up and down the labium under the hairy surface. After a few days the phlegmon gradually undergoes softening at some particular place, and an area of redness appears. The affection is very painful and calls for energetic treatment. Cold, in the beginning, is anodyne as well as sedative. Later, sitz-baths, poultices, or fomentations, frequently changed, are to be used. On account of the tendency to spread, an early evacuation, by incision on the inner surface, is indicated. In chronic cases connected with the suppuration of the vulvo-vaginal gland, all of the pus-secreting surfaces and indurated tissue must sometimes be excised or curetted with a sharp curette, to get rid of deep-seated sinuses and pockets that resist ordinary treatment.

EXANTHEMATA OF THE VULVA.

Herpes, Eczema, and Prurigo of the vulva present similar characistics to the same symptoms in other parts of the body.

Herpes is usually a transient affection, and requires only that the parts be protected from irritation. It consists in a group or groups of vesicles, without any inflammation of the surrounding skin. The inguinal glands are occasionally tender. A saline laxative, a bland ointment, or a soothing lotion, and a mildly carbolated or a borated vaginal douche, if the vaginal discharges be irritating, will usually be followed in a week or ten days by a cure. A powder of oxide of zinc and chalk, equal parts, may be used after the vesicles break.

Sometimes herpes occurs in the confluent form, covering the vulva, and lasting for ten days or two weeks. It is often connected with gastro-intestinal disturbances, and may return periodically. Uncleanliness is a prolific cause.

Eczema is characterized by an eruption of vesicles and some inflammation of the underlying and surrounding skin. When the vesicles rupture a serous fluid exudes which tends to dry on the surface and form scabs. If the disease continues, the skin remains red, becomes thickened, and may in time assume a more or less cicatricial character. These conditions may spread to the neighboring skin. Itching is a prominent symptom. The itching that accompanies diabetes is apt to be due to eczema.

In the acute stage, saline or mercurial laxatives, a restricted diet, with soothing local applications, such as bismuth powder, a lead lotion, cold cream, 1 per cent. carbolic-acid douches, hip-baths, or the benzoated oxide-of-zinc ointment with 5 or 10 per cent. of carbolic acid added, may be used. In obstinate cases strong solutions of carbolic acid (5 per cent.), or nitrate of silver (2 per cent.), may be required to stimulate the circulation of the parts. The scabs and secretions should be washed off with almond or other unirritating soap before the ointments are applied. Saline and mercurial laxatives, digestives, iron, arsenic, etc. may be required as for eczema elsewhere. Dryness and cleanliness of the parts are essential, and friction is to be as nearly excluded as possible.

Prurigo is a papular eruption causing distressing pruritis, and is difficult of cure. The causes are not well understood, although it often occurs in unclean and unhealthy subjects.

Attention to the general health and hygienic surroundings is imperative. The carbolized zinc ointment above referred to, with the addition perhaps of 2 per cent. of menthol, often affords great relief. From a 5 to a 10 per cent. solution of chloroform in oil of sweet almonds relieves the itching in some cases, and may do something toward dissolving out the tenacious masses at the bottom of the papillæ. A mixture of ether and alcohol (1 : 4) may be used for this latter purpose, or chloroform and alcohol (1 : 4) if well borne.

Erysipelas and *Diphtheria* of the vulva should be treated upon the same principles as cases occurring in other parts. They are rare affections, and occur in most instances in puerperal women and new-born children.

GANGRENE OF THE VULVA OR NOMA.

Gangrene of the vulva occurs in poorly-nourished young children living in unhygienic surroundings, and is exceedingly fatal. It begins with reddening and infiltration of one of the labia, accompanied by a discharge of ichorous serum, followed by vesication and the formation of a grayish-green slough and rapid gangrene. The condition has been likened to noma in the mouth. It is a rare disease, produced by infection, and has been known to be infectious.

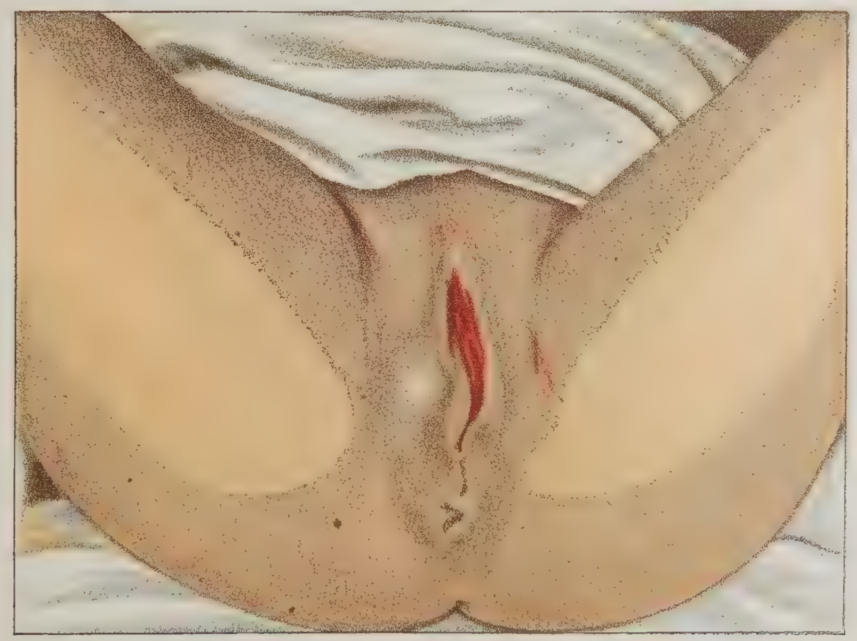
If recognized early enough, the parts should be excised, and the resulting wound, if not favorable for obliteration by sutures, should be frequently disinfected with strong antiseptics and kept constantly moistened with a weak antiseptic solution. The vital powers should be sustained with alcohol, strychnia, digitalis, and frequent forced feeding.

PRURITUS VULVÆ.

Pruritus Vulvæ is usually a symptom rather than a disease, and stands for an intense or persistent itching of the vulva, more often felt about the clitoris and vestibule, but sometimes extending to the surrounding parts. The itching, depending upon palpable or visible local inflammatory disease, is not referred to in the consideration of this affection. It is often a serious trouble, in that it is apt to lead young people into the habit of masturbation, but should not be confounded either with the irritability attendant upon that habit or with nymphomania.

The CAUSES may be reflex or local. Irritating and indigestible foods or drinks may bring on the attacks in some cases by reflex action or by vitiating the urine. The rubbing of clothes, the friction of walking, and heat of the bed act as exciting causes in those predisposed to it. Local congestion, such as occurs about

PLATE XVI.



Distended Vulvo-vaginal Gland.

the menstrual period in certain cases of pelvic inflammation, or in early pregnancy, or at the end of pregnancy when the vulval and vaginal veins are distended by pressure above, or in old people with dilated veins, is an occasional cause. Constipation, sedentary habits, portal congestion, œdema, etc., favor it. Irritating discharges, though scanty, from follicular cervicitis, carcinoma, uterine sarcoma, diabetes, and incontinence of urine, are sometimes responsible. Parasites may also act in the same way.

The DIAGNOSIS is based upon the intermittent character of the itching, the absence of local inflammatory or eruptive disease, and the discovery of one of the above-mentioned or other remote causes. Oftentimes no cause whatever can be detected. The local symptoms are a shiny, red, somewhat œdematous appearance of the parts about the vestibule, with perhaps some serous secretion. Later, changes may occur as the effect of scratching, such as excoriations, thickening of the nymphæ, dryness, cicatricial spots, and furuncles.

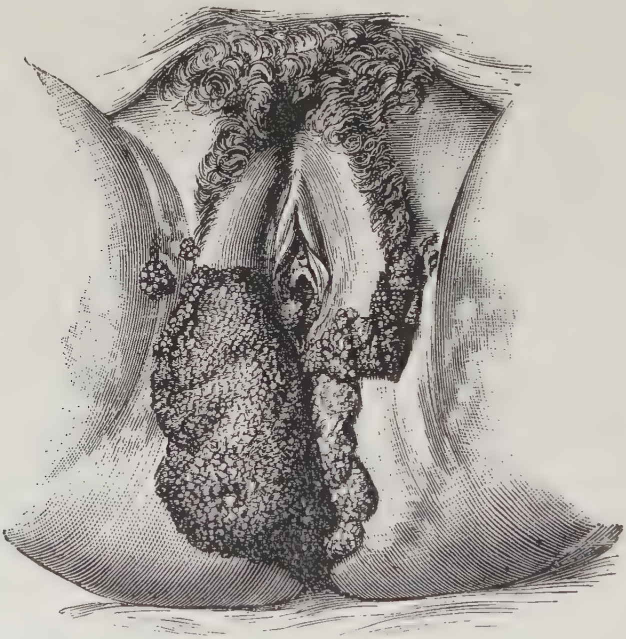
The TREATMENT should of course depend upon the cause, which must, if possible, be removed. When dependent upon diabetes or incontinence, the parts should be protected from contact with the urine by some powder or ointment kept constantly applied, such as bismuth subnitrate, unguentum resinæ, or a benzoated oxide-of-zinc ointment containing a 5 or 10 per cent. solution of carbolic acid. When from irritating vaginal discharges, the applications may be used with antiseptic vaginal douches and vulval washes, such as 1 : 2000 aqueous solution of mercuric bichloride or 2 per cent. carbolic acid. Skene highly recommends a 1 : 500 solution of the bichloride in emulsion of bitter almonds. When due to venous congestion, astringents act beneficially, such as lead, in washes and in vaginal douches, a 1 or 2 per cent. solution of nitrate of silver in water, or the oxide-of-zinc powder, strong or diluted with an equal quantity of chalk. General debility, gastro-intestinal derangements, uncleanliness, and the like should be faithfully attended to. To relieve the itching many remedies have been used. The benzoated oxide-of-zinc ointment, with the addition of 10 per cent. carbolic acid or 5 per cent. of menthol, is useful. A 10 per cent. emulsion of chloroform in olive oil or a 5 per cent. aqueous solution of cocaine gives temporary relief. The treatment is of necessity often empirical. Many patients suffer continuously for years without obtaining relief. Under the most favorable circumstances a cure is difficult and is only obtained by persistent attention to the details of treatment. Cleanliness, dryness, and a minimum amount of friction add materially to the desired result.

SPECIFIC DISEASES OF THE VULVA.

Gonorrheal Vulvitis is an inflammation of the vulva caused by the specific germ of gonorrhea, and may be considered as a part of specific or gonorrheal vaginitis.

Syphilitic Affections of the Vulva occur in the form of chancres, mucus-patches, and syphilitic skin eruptions. The chancre has a dark-red surface, is sharply defined, is not excavated, is not tender or itchy, is single, with a hard base, and presents firm resistance to the fingers grasping it from the sides. Inguinal glands are ordinarily enlarged without much tenderness.

FIG. 109.



Simple Vegetations of the Vulva.

The ulcerations or eruptions following vulvitis are itchy, tender, somewhat excavated, and have not a firm base, except in connection with surrounding infiltration. Mucus-patches, gummata, and the skin eruptions exist in connection with other manifestations of syphilis, and have the same characteristics as those occurring elsewhere. The inguinal glands may be tender, but do not become greatly enlarged. A chancre may ulcerate at its centre, but preserves its characteristics at the edges.

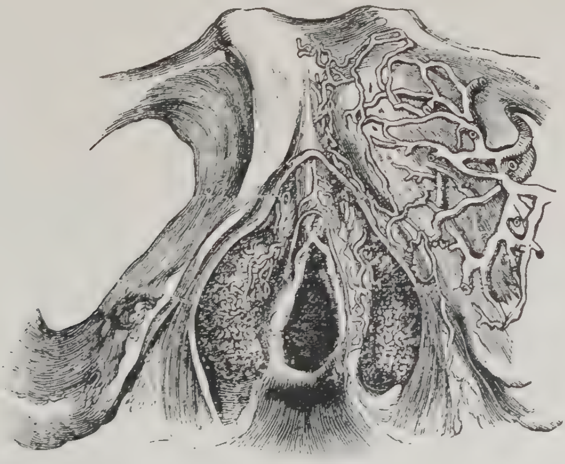
The *Chancroid* is multiple, has sharply-defined edges, suppurates freely, has a soft yellowish or greenish fissured base, and is usually accompanied by a large, tender inguinal gland, with tendency to suppuration. The sharp edges and yellowish or greenish base distinguish it from other ulcerations or eruptions. They should be treated by cauterization, iodoform, and frequent antiseptic lotions.

Venereal Warts are the result of venereal or unclean genital discharges. They consist in irregular masses of papillomata about the anus or vulva. Vaginal douches of 1 : 2000 bichloride of mercury, frequent washings with the same, the constant application of the oxide-of-zinc ointment with 10 per cent. carbolic acid, or of resin cerate, will occasionally result in a cure. Cauterization with nitro-muriatic acid is usually effective. When much elevated above the surface of the skin (condylomata), they should be cut off and the base cauterized.

INJURIES OF THE VULVA.

Injuries to the external genitals in women and children from blows, falls from elevated places upon the end of stakes, pitchforks, backs of chairs, fences, etc. sometimes prove serious from the hemorrhage that is liable to follow injury of the corpora cavernosa.

FIG. 110.



Plexus of Veins of the Vestibule.

The first marital embraces, and even brutal kicks by intoxicated husbands, have produced extensive contusions and lacerations.

Contusions should be treated as those occurring elsewhere in the cutaneous tissue. Lacerations should be sutured with deep stitches, so as to close up all deep veins, and thus prevent extravasations of blood and subsequent abscess.

HEMATOMA OF THE VULVA.

Hematoma of the vulva occurs in the puerperal state as the result of the pressure of the head during labor, or in the non-puerperal state, from blows or fine punctures, producing a lesion of a vein in the corpus cavernosus. It is usually unilateral.

When found after labor it may be as large as the fist or larger, but is seldom half as large under other circumstances. It is felt as an elastic globular tumor in the labium, without much heat or tenderness, and unaffected by coughing or increased intra-abdominal pressure made by the patient. Often the first sign is a feeling of discomfort in the part, and the accidental discovery by the patient of the enlargement. In other cases a sudden burning pain is felt, followed by a feeling of tension and a desire to urinate or defecate.

The hematoma either is gradually absorbed, remains for a long time encysted, or undergoes the suppurative process.

An hematoma larger than a walnut, detected as soon as, or before the bleeding has stopped, is best treated by an incision between the labium majus and minus, a clearing out and disinfection of the cavity, and suturing so as to include the vessels and close the wound completely. A small effusion may be treated by the application of an ice-bag in the hope of preventing an increase. After the hematoma has formed and shows no sign of growing larger, it may be let alone with the expectation that it will be absorbed. When it has become encysted the patient may choose between having the cyst excised or waiting for a tedious length of time for slow absorption. To excise, evacuate, and pack the cyst with gauze, usually means a slowly-contracting cavity or an abscess; hence it is always well to enucleate or dissect out the cyst-wall and close the wound completely with deep sutures. After suppuration has commenced the abscess should be opened without delay, and, if possible, the abscess-wall excised and the wound sutured with antiseptic precautions. When the facilities for such treatment are wanting, incision, disinfection, and packing with gauze is the next best procedure.

Varicose Veins of the Vulva may be caused by pressure upon the pelvic veins by the pregnant uterus, intra-pelvic tumors or accumulations, or, in those predisposed to it, particularly in hot climates, by constipation, straining at stool, or occupations requiring constant standing with the exertion of intra-abdominal pressure.

During pregnancy they may form a swelling as large as the fist, and may rupture during labor, causing a large hematoma.

In the non-puerperal state they cause a slight swelling of one or both of the labia, or can be seen on the inner surfaces, often extending into the pelvis.

They either give rise to no trouble or produce a feeling of burnning, an itching or fulness, with perhaps a slight desire to urinate.

Astringent washes, vulval pads under a T-bandage, rest in the recumbent position for a few hours each day, and the avoidance of standing, leaning over and lifting, are helpful. The bowels should be well regulated, and the general nutrition and vigor of the patient promoted by tonics, massage, moderate exercise, fatty foods, etc.

When a varicose vein ruptures compression will usually control the hemorrhage temporarily, but, as it is pretty sure to return after the pressure is removed, the ligature should be resorted to.

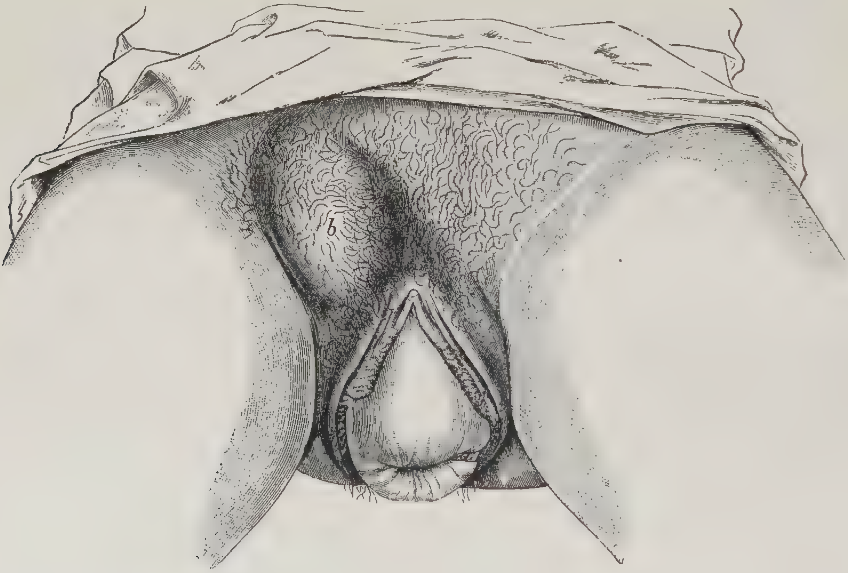
HYDROCELE OF THE LABIUM MAJUS.

Hydrocele in the female is a rare affection, and usually consists in a prolongation of the peritoneal pouch (canal of Nuck) along the round ligament, through the inguinal canal, to the mons Veneris and into the tissues of the labium majus. Usually the sac closes by adhesion of the peritoneal surfaces at the internal abdominal ring. The labium, particularly the upper part, is enlarged, as in the case of hernia, but with less fulness at the external abdominal ring. If the communication with the abdominal cavity be not obliterated, the swelling disappears when pressed, and may be felt to vary in size with increase or decrease of abdominal pressure (coughing, etc.). Usually, however, the tumor is elastic, translucent, and yields clear serum upon aspiration. It is *not* tender to moderate pressure. When the tumor is reducible a truss may be worn. When not reducible it may be aspirated. If it fills again, it should be evacuated, and obliterated by an injection of tincture of iodine. If this does not cure it, the entire sac should be dissected out and the parts sutured with silkworm gut.

Pudendal Hernia.

Pudendal Hernia (hernia labialis inguinalis) corresponds to scrotal hernia in the male. The canal of Nuck and the inguinal canal become dilated, and the intestine and peritoneum are forced along the round ligament to the external ring and into the labium majus. A rounded tumor is felt in the upper part of the labium, prolonged into the inguinal ring, soft, insensitive to pressure, compressible, sometimes resonant upon percussion, and usually disappearing entirely, with a gurgling sound, if the patient be placed in the knee-chest position. It is very seldom strangulated. The omentum, and, very rarely, the ovary may be found in the sac.

Fig. 111.



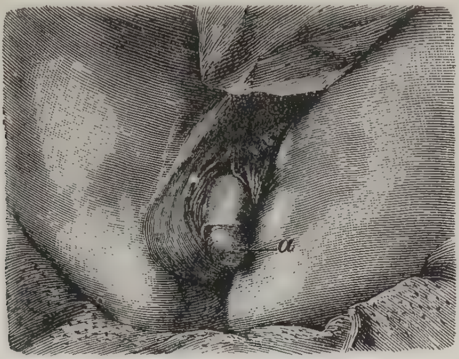
Hernia Labialis Inguinalis and Uterine Prolapse.

It is differentiated from a distended vulvo-vaginal gland, in that the latter is well down in the labium, is tense, tender, irreducible, and cannot be traced upward. Vulval abscesses are tender and surrounded by indurated tissue.

The TREATMENT consists in a replacement and the adjustment of a truss with a perineal strap to pass over the labium. A description of the operations for strangulated hernia and permanent closure of the inguinal canal belongs to works on general surgery.

Posterior Pudendal Hernia (hernia vaginalis labialis) has been observed a few times. It appears in the posterior portion of the labium majus, and consists in a defect in the pelvic fascia anterior to the broad ligament, with descent of the contents of the abdominal fascia along the vagina into the labial tissues.

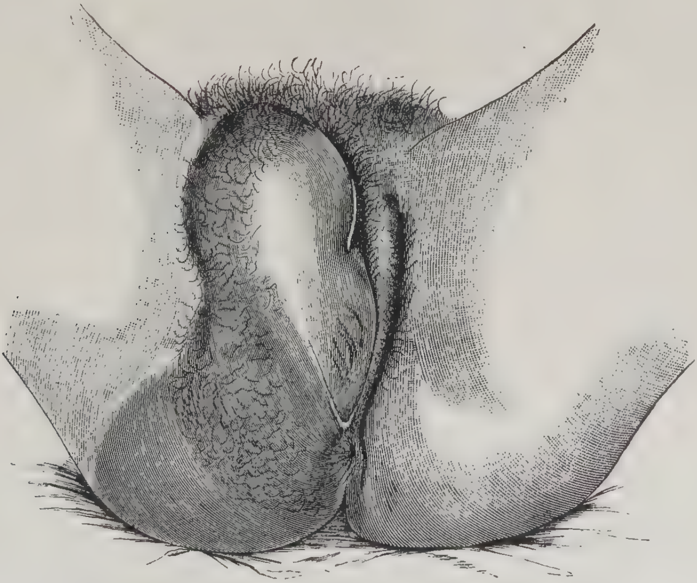
FIG. 112.



Hernia Vaginalis Labialis.

The DIAGNOSIS is made in the same way as for the ordinary pudendal hernia, excepting that the contents extend under the pubic ramus. Stoltz was able to feel the defect in the fascia and levator ani through which the protrusion occurred. According to

FIG. 113.



Hernia Vaginalis Labialis, extending into the Labium Major.

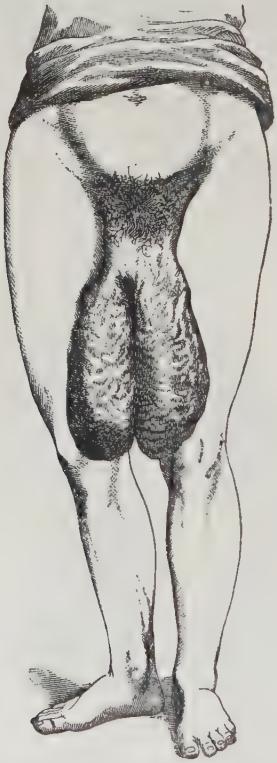
experience, pessaries and operations are useless. A belt with a pad attached to a stem may be adjusted.

TUMORS OF THE VULVA.

Elephantiasis.—Elephantiasis occasionally affects the external genitals of the female, and exhibits the same characteristics as that occurring in the skin elsewhere. It usually affects the entire vulva, and in tropical countries has been known to form a large tumor hanging between the thighs.

The DIAGNOSIS is made by the fact that the swelling affects the skin itself and cannot be separated from it, as in fibroma, lipoma, and cystoma. Venereal warts are implanted upon soft natural skin, while the papillary excrescences of elephantiasis grow upon thickened, indurated skin.

FIG. 114.



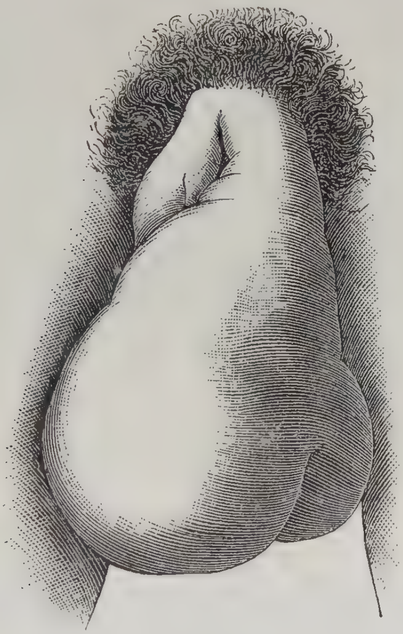
Elephantiasis of the Labia.

Malignant tumors are accompanied by deep-seated induration, and more ulceration in proportion to the enlargement; they run a malignant course, while elephantiasis never kills. Lupus has more discoloration, deeper-seated induration, and ulcerates more extensively.

The TREATMENT consists in removal of the mass and suturing the wound.

Fibroids of the Vulva occur most frequently in the labia majora, but have been observed in the labia minora and perineum. They are hard, well defined, insensitive, and movable under the skin, unless developed in the cutaneous connective tissue, when they project and even become pendulous. They may undergo cystic degeneration. Sometimes they become quite large and the skin over them ulcerates.

FIG. 115.



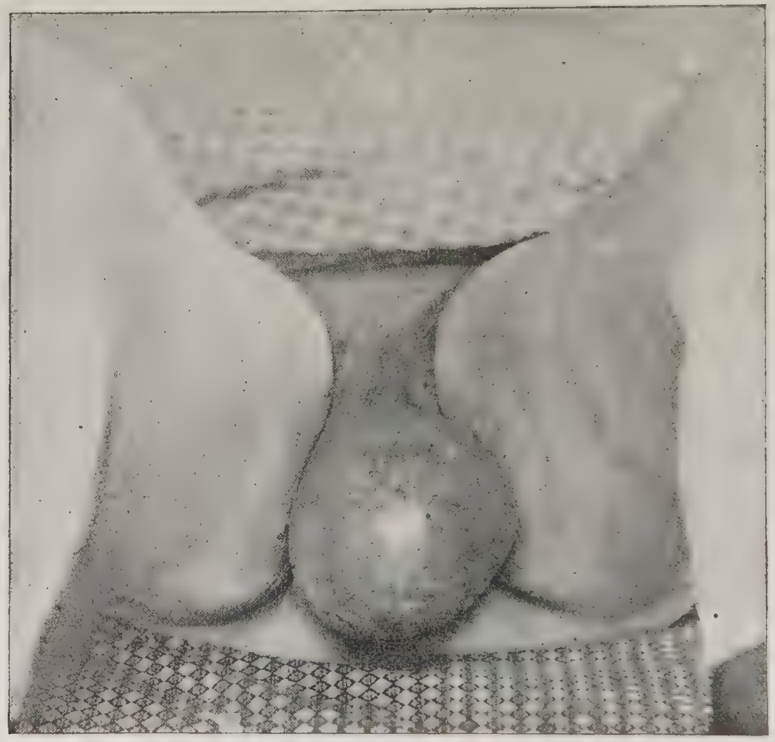
Fibroid of the Left Labium Majus.

They should be removed by the knife as soon as discovered.

Vulval Cysts are usually distended glands found in the labia majora, and may be single or multiple, deep-seated or superficial, varying from the size of a pea to that of a walnut or an egg, and occasionally larger. They are easily recognized as elastic bodies that yield a serous fluid upon aspiration. Usually they enlarge in a downward direction.

The best TREATMENT consists in the removal of the entire sac by dissecting it from its connective-tissue surroundings, and closure of the wound by deep sutures.

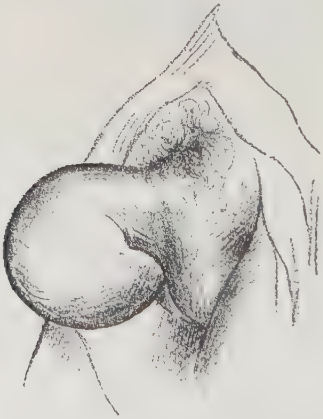
FIG. 116.



Cyst of Right Labia Majora.

Cystic tumors of the clitoris have been met with a few times. They usually contain a bloody fluid. Sometimes they gradually

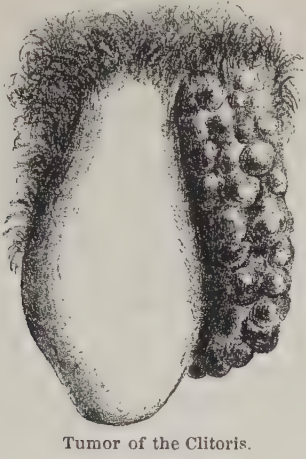
FIG. 117.



Cystic Tumor of the Clitoris, containing twenty-two ounces of fluid.

shrivel up, after having their contents evacuated, and at other times they require amputation. Sometimes they attain a moderate size, and then stop growing, and the patient may prefer to have nothing done, as in Emmet's case.

FIG. 118.

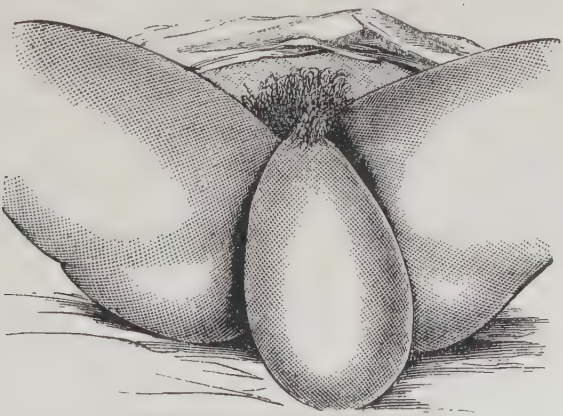


Tumor of the Clitoris.

LIPOMA OF THE VULVA.

Fatty tumors may occur in the vulval, as well as in other fatty tissue. Usually they are somewhat soft, and when a large size is attained, give a sense of fluctuation to the percussing finger. They are a little softer than fibroids, but the skin is somewhat hypertrophied, and is apt to be contracted in spots, corresponding to depressions between the lobules of the tumor. They may resemble elephantiasis, but fluctuate more distinctly.

FIG. 119.



Adipose Tumor of the Left Labium.

The TREATMENT consists in removal by the knife.

Occasional cases of Neuroma, Enchondroma, Melanoma, and Angioma of the Vulva have been observed, but their occurrence is so rare that a description is here superfluous. They should be removed the same as if found elsewhere in the body.

COCCYGODYNIA.

Coccygodynia is the name given to pain in the coccyx, induced by motion of the part, whether from external pressure or contraction of the muscles attached to it.

The disease consists usually of a local arthritis. Not infrequently there is a rigidity or ankylosis of the joints, with dislocation or fracture, forming an artificial joint. Necrosis sometimes results.

Parturition in old primiparæ in whom the articulations have become rigid, and falls or blows upon the coccyx, are the ordinary causes. Rheumatism may possibly produce it. The principal symptom is pain in the coccyx upon sitting down, getting up or changing position. Any posture in which the coccyx is pressed up, or which calls into play its attached muscles, is intolerable. Sexual intercourse and straining at stool are apt to be painful. The disease is diagnosed by taking the coccyx between the finger, introduced into the rectum, and the thumb placed between the nates, and moving the bone, thus bringing on the pain.

Under certain circumstances the PROGNOSIS is favorable, although several months, or even years may elapse before all sensitiveness will subside.

The TREATMENT must be conducted upon the same principles as in a traumatic arthritis elsewhere. First, the avoidance of all motion of the joints or pressure upon the bone. Rest on the side, air-cushions to sit upon, with great care in sitting down, getting up, leaning over, or twisting the trunk, so as to avoid producing the pain, are items of prime importance. Leeching and cold applications in the acute stage, counter-irritation and alterative applications in the subacute and chronic stages, are beneficial.

In neglected cases, subcutaneous tenotomy or extirpation must occasionally be resorted to.

Tenotomy is performed by introducing a tenotome under the skin at the end of the coccyx, pushing it along the side of the bone, and severing the entire muscular attachment, first on one side and then on the other, and finally at the lower end. The relief afforded is great, but often only temporary, on account of the reunion of the severed parts.

Extirpation is accomplished by a longitudinal incision down to the bone, amputation through the second joint, and severance of the attachments; or the attachments may be severed first, the coccyx dislocated backward, and the entire bone removed.

Vulvo-vaginal Hyperesthesia and Vaginismus.

Vulvo-vaginal Hyperesthesia consists in an extreme sensitiveness of a part, or of all parts, of the vulvo-vaginal entrance, except the labia majora.

In some cases there is a congested appearance of the parts, or even inflammation and erosion; in others there is nothing abnormal to be seen. The pathological conditions sometimes consist in inflammation of the inner genital organs, with or without irritating discharges, or in a disordered state of nutrition and enervation. Inflammation about the hymen or cicatricial contractions about the carunculæ cause the most severe forms.

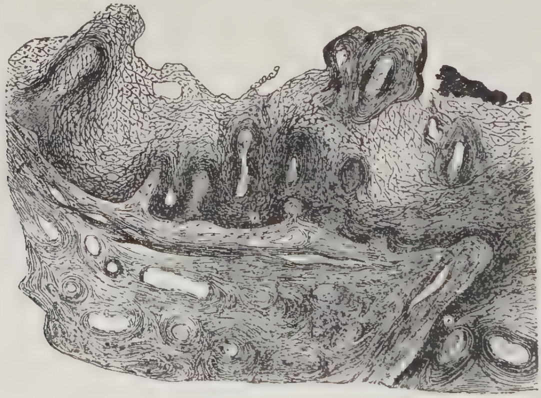
The most noticeable symptom is sudden flinching or a manifestation of pain upon the least touch of the parts, although if the finger can be placed quietly on the hymen or in the vagina and left there, the complaints soon cease until some motion is made, when they begin again. Coitus may be excessively painful or not tolerated at all. Anything that alarms the patient, or even calls her attention to the condition, increases the difficulty.

The TREATMENT consists in removing all inflammatory conditions, if such exist, by the means recommended elsewhere. Soothing or anesthetic washes or ointments, such as a 5 or 10 per cent. solution of cocaine, or half that strength of menthol in cerate, or oxide-of-zinc ointment, may be used previous to all manipulations and at other times when discomfort is felt. Sometimes a 5 per cent. solution of nitrate of silver or strong carbolic acid applied once a week is useful to cure erosions or ulcerations.

A valuable means of diminishing, and sometimes of curing the trouble in mild cases consists in introducing a bivalve speculum two or three times weekly, and slowly, almost insensibly, stretching the vagina and vaginal entrance until decided discomfort, but not severe pain, is felt, and then in placing a pledget of wool in the upper part of the vagina and leaving it for twenty-four or thirty-six hours. The pledget should be small at first, but gradually increased in size until the vagina is well tamponed. It is preferable to place a small cotton pledget saturated in a 50 per cent. solution of boro-glyceride against the cervix, and the dry wool below it, but not low enough to press at the vaginal entrance. An uncomfortably tight vaginal packing or rough or painful treatment or manipulation in the beginning might antagonize the patient and make her worse. Mildly stimulating and antiseptic vaginal douches, such as 2 per cent. carbolic acid or 1 : 200 to 1 : 500 solutions of permagnate of potassium, often help to render the vulvo-vaginal nerves tolerant. A general tonic treatment is of great benefit in many cases.

Vaginismus is a vulvo-vaginal anesthesia of an aggravated character, with peculiar painful spasmodic contractions of the perineal and levator ani muscles. The causes of both affections are similar, but small spots of erosion about the vaginal entrance, or a diseased condition of the hymen or its remains are more frequently found in vaginismus. Frequently no cause whatsoever can be discovered.

FIG. 120.



Fibro-papillary Hypertrophy of the Hymen in a case of Vaginismus.

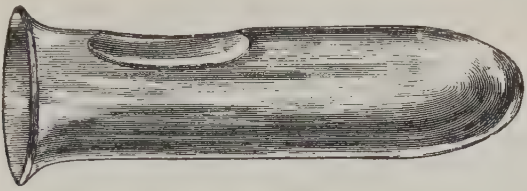
Coitus is seldom tolerated, and the attempt causes a firm closure of the vagina by the contraction of the constrictores cunni et vaginæ. A vaginal examination is often impossible until the patient is anesthetized, when the orifice becomes relaxed.

In mild cases the TREATMENT given above for vulvo-vaginal anesthesia may be tried, especially the vaginal packing. Sometimes a thorough stretching under anesthetics, with the subsequent daily introduction of a glass plug dilator, will effect a cure. The stretching can be accomplished by introducing a large bivalve speculum, separating its blades widely, and withdrawing it quite rapidly.

The glass plug is the shape of a widened test-tube, about 2½ inches in diameter, and should be worn four or five hours a day for a few days, then two or three hours a day for several weeks.

In a few cases it may become necessary to practise J. Marion Sims's plan of excising the hymen and cutting deeply into the constrictor cunni and edge of the levator ani on either side, so as to completely relax the vaginal entrance.

FIG. 121.



Sims's Vaginal Dilator.

The plug should then be worn almost constantly for a few days, then two or three hours daily for ten days or two weeks. Intercourse should not be allowed until the wounds have been for some time entirely healed.

IMPERFORATE HYMEN.

As the symptoms of imperforate hymen are the same as in many cases of atresia of the vagina, it will be appropriate to consider both of the affections under the latter heading.

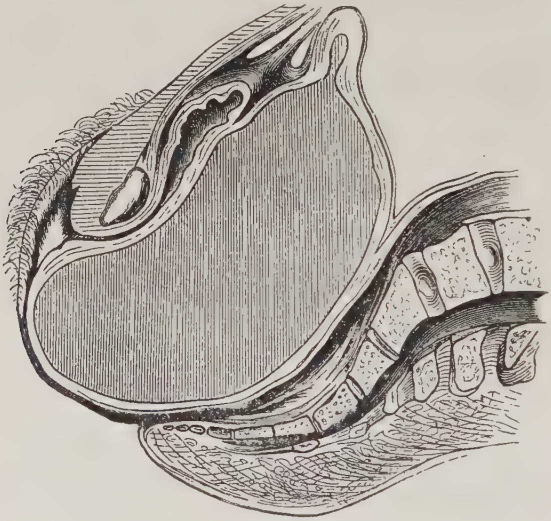
ATRESIA OF THE VAGINA.

Atresia of the Vagina may be congenital or acquired, and may involve any part or all of the vagina, from the hymen to the cervix.

CAUSES.—The congenital variety arises from some pathological condition, usually inflammation, that has existed before birth, causing adhesion of the mucous surfaces of the hymen or vagina. After birth it may be caused by septic or gangrenous vulvitis, or inflammation connected with diphtheria, typhoid fever, scarlatina, or measles, or by destruction of the vaginal epithelium or walls, following the introduction of chemical or mechanical agents. In such cases either adhesion of the walls or cicatricial contraction in the ulcerated or sloughing parts occurs. Sloughing after labor, resulting in circumscribed or complete loss of the vaginal walls, is accountable for quite a large proportion of cases. Non-puerperal traumatisms also enter as a causative factor.

Varieties.—The places of obstruction may be low down, consisting either of an imperforate or impervious hymen, or of the occlusion of the lower end of the vagina. The obstruction may be in the middle or upper portion or in different portions of the viscus, or it may involve the whole canal. Another variety consists in a double vagina and uterus, one side of which ends in a blind sac above the hymen. In many cases the condition is one of stenosis instead of complete obstruction.

Fig. 122.



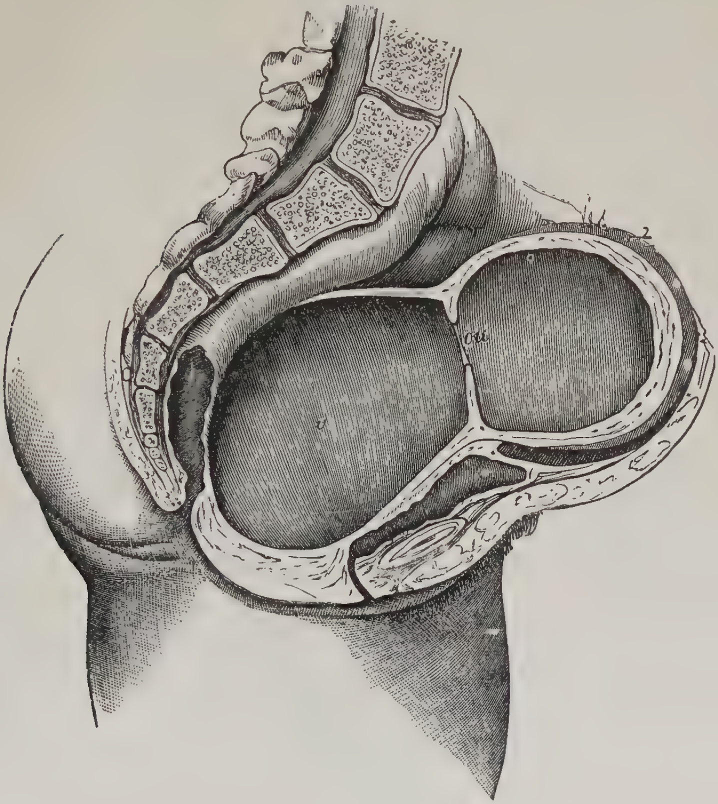
Atresia of the Hymen.

Complete or extensive congenital obstruction of the vagina is generally found in connection with deficient development of the uterus and ovaries.

Course.—Obstruction at or near the hymen may be accompanied by a retention of mucus in early life, and of the menstrual fluid in later life, particularly if the development of the uterus and ovaries has not been interfered with. The vagina becomes dilated and hypertrophied, and sometimes also the cervix, uterus, and Fallopian tubes. These latter are more often dilated when the atresia involves the upper portion of the vagina, and in such cases pelvic peritonitis often ensues with adhesions, and occasionally rupture of the tubes.

When there is occlusion of the lower end of one side of a double vagina and uterus, the occluded side is most liable to burst into the other side, particularly through the cervical septum. The tissues then become infected, and develop into a pyokolpos or pyometra. The dilated Fallopian tube has also been observed to burst into the peritoneal cavity.

FIG. 123.

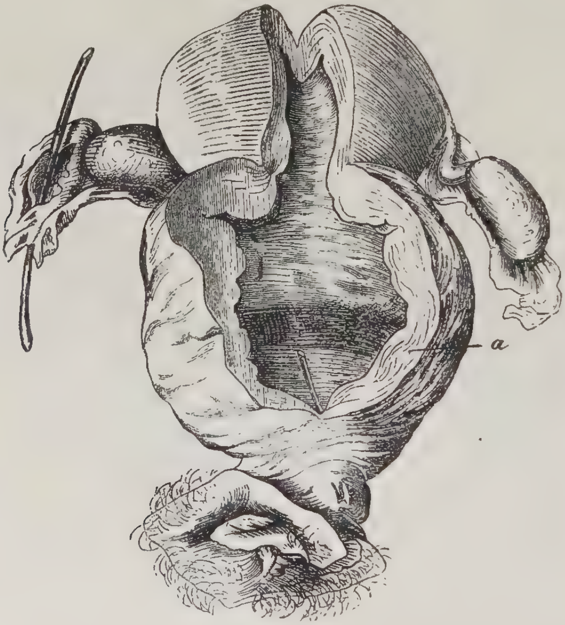


Complete Occlusion of the Vagina : *v*, vagina ; *ou*, uterus.

SYMPTOMS.—The deformity may be discovered in early life, but the symptoms do not usually appear until after puberty. Amenorrhea is as a rule the first. Recurrent menstrual pains are felt each month, but attention may not be called to the condition until the patient marries and finds copulation to be impossible. After considerable accumulation has taken place, pressure upon the bladder or rectum may cause pain in these organs and interfere with their normal action. Later, the symptoms of pelvic peritonitis, pelvic hematocele, or septicemia may be added, in connection with the development of hematosalpinx, and rupture of the uterus or tube, or of pyometra and pyosalpinx.

DIAGNOSIS IN CASE OF IMPERFORATE HYMEN.—Physical examination reveals an absence of the vaginal entrance and the presence of an elastic swelling under the pubic arch, which sooner or later can be detected over the pubes. Obscure fluctuation or a feeling of elastic continuity is then recognized if one hand be placed over the pubes and another upon the swelling below, whether from its vulval aspect or by rectal indigitation. The finger in the rectum recognizes an elastic globular tumor partially or completely filling the pelvis. A catheter in the urethra passes in front of the mass.

Fig. 124.



Hypertrophied Vaginal Walls above an Atresia of the Vagina.

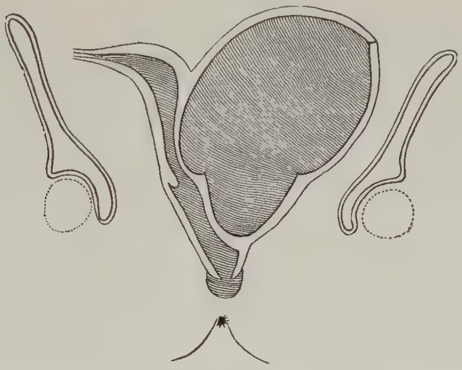
There is but little tenderness of the parts except at the time of the menstrual pains.

Stenosis, or incomplete obstruction, is known by the fact that an occasional escape of the menstrual fluid occurs. A careful examination, particularly under an anesthetic, will usually lead to the discovery of a small opening. The opening is sometimes found just under the urethra, pointing upward, and is most easily located by means of a fine bent probe.

Congenital atresia is nearly always discovered at or near puberty, if not earlier. The acquired forms often show some irregular contractions or cicatrices due to past inflammation. Cicatrices are made more noticable by hooking a finger in the anus and putting the perineum on the stretch.

Occlusion of the lower end of the vagina gives rise to the suprapubic tumor, but is not accompanied by the elastic vulval swelling. The finger in the rectum and the sound in the bladder enable us to feel just how far down toward the vulva the retention tumor reaches. When the whole vagina is occluded the bimanual rectal examination discovers the enlargement to be uterine and the vagina to be collapsed or in the form of a fibrous cord. When the occlusion is in the upper part of the vagina, its upper end is discovered by the same bimanual examination, and the lower end by the finger, or sound in the vagina introduced while the finger is still in the rectum.

FIG. 125.



Double Uterus and Double Vagina, with Retention of Menstrual Fluid on the Left Side.

On account of the uterine enlargement it is difficult to recognize the dilated tubes, although an anesthetic will sometimes enable us to do so.

Occlusion of one side of a double vagina is not accompanied by amenorrhea. The other symptoms, as well as the signs obtained by rectal and abdominal examination, are much the same as in cases of single vagina. The finger in the vagina, however, discovers a rounded tumor projecting into it from one side and flattening the cervix, so as to render the os somewhat crescentic in shape, with the concavity toward the affected side. If the tumor be aspirated from the vagina, a tarry fluid will be withdrawn, proving its nature. When there has been a perforation in the cervical region, pyokolpos and pyometra will usually have resulted. The tumor is less firm, and pressure upon it generally causes pus to flow into and out of the vagina. There will be septic symptoms, with occasional discharges of pus *per vaginam*, giving temporary relief. If rupture of the septum does not occur, the mass may finally project through the vulva and give the appearance of a prolapse of the vagina or a cyst of the vaginal wall.

Prognosis.—Without interference the prognosis is, as a rule, bad. Dilatation of the uterus and Fallopian tubes, with pelvic peritonitis and adhesions, and occasionally rupture of the Fallopian tubes, pelvic hematocele, and even death, follow. Distortion of the organs concerned, with permanent destruction of their functions, is the rule when interference is delayed. Bursting externally, excepting in the cases of double vagina, seldom occurs, and even then only after irremediable damage is done to the organs of procreation.

Treatment.—The only rational treatment consists in evacuation of the fluid, and this should be done as early as possible after its discovery. The danger connected with the operation is threefold—viz. (1) danger of intraperitoneal rupture of a dilated and adherent Fallopian tube, as the vagina contracts; (2) of sepsis due to infection of the contents through the opening made; and (3) of injury of the bladder and rectum during the operation.

In cases of occlusion at or near the hymen, in which the accumulation is only recent, the second danger—viz. sepsis—is the only one to be feared. When the accumulation is of long standing and forms a large suprapubic tumor, the first danger—viz. rupture of a Fallopian tube—is to be guarded against. The best way is to make a small opening into the mass and allow the contents to flow away gradually, taking from one to two or three hours; then to enlarge the opening by a crucial incision and wash out the sac with a great quantity of sterilized saline solution ($\frac{1}{2}$ of 1 per cent.), and pack the vagina loosely with iodoform gauze. In no instance should a long time elapse between opening and cleaning out, for fear of serious or fatal septicemia. Aseptic and antiseptic precautions must be observed throughout.

The gauze should be removed in twenty-four hours, and the cavity thoroughly washed out with a mild antiseptic solution, such as a 1 per cent. carbolic-acid solution, twice daily. The tendency to contraction of the opening may be combated by having the patient wear glass plug part of the time.

When the atresia is higher up in the vagina, all three of the dangers above mentioned are to be guarded against. It is necessary to dissect with the scalpel and finger, using the latter as much as possible, between the bladder and rectum, toward the tumor. A finger should be kept in the rectum as much of the time as possible for a guide, and the bladder held out of the way by a catheter or sound. As soon as the tumor is felt through the new opening, a trocar should be pushed into it, and the contents allowed to ooze out very slowly, and then the opening enlarged by small cuts with a probe-pointed bistoury and moderate stretching with the finger.

Puncture through the rectum or bladder may be resorted to when it is impossible to operate safely by way of the vagina, but these are makeshift methods attended with danger from sepsis, and should only be resorted to in case of absolute necessity. They are, however, preferable to a let-alone policy.

Retention in one side of a double vagina should be treated on the same principles as the varieties already mentioned. The evacuation should be provided for through the vaginal septum. Excision of a portion or all of the septum is the surest way of effecting a complete cure.

Vaginitis.

The vaginal membrane partakes more of the character of skin than of mucous membrane. On account of its protected situation the horny layer is not well developed, except in some cases in which the membrane protrudes continuously through the vulva. At the upper end, however, it partakes a little more of the character of mucous membrane, in that it here contains a few muciparous glands. This dermoid character enables it, in its normal state, to resist infection by the various pathogenic bacteria that enter it.

Etiology.—Any influence, however, which injures the vaginal epithelium, such as the long-continued friction of foreign bodies or chemically irritating secretions or injecta, diminishes or annihilates this resisting power. If accompanied by a lack of drainage and consequent accumulation of secretions, the microbes multiply, infection follows, and vaginitis finally results.

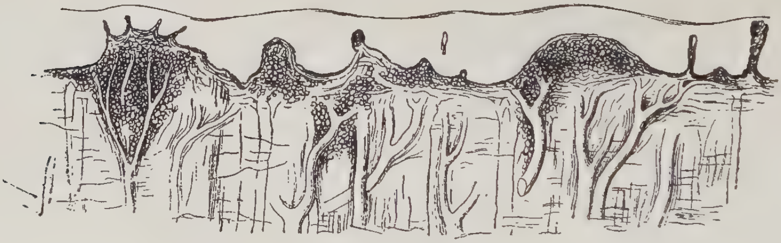
Irritation, instead of exciting inflammation, merely leads to an increase in the density of the epithelium, with increased resisting power, as is the case with cutaneous irritation. Even a local loss of epithelium is not accompanied by an extension of the inflammation, provided the secretions find a ready outlet or are kept washed out.

Disordered states of the general system, such as anemia, chlorosis, indigestion, constipation, and conditions which tend to produce unhealthy conditions of the skin, predispose to vaginitis. Pregnancy, abdominal tumors, and any condition that produces pelvic congestion, whether venous or arterial, may also be considered as predisposing causes, and are to be taken into account in the treatment. Pregnancy acts both by producing venous congestion and œdema and by increasing the activity of the secretions. Secretions retained by a tight hymen may become infected and overcome the resistance of the pavement epithelium. Pin-worms, masturbation, and other causes of uncleanliness may have a similar effect. Pathogenic secretions from the uterus, urethra, vulva, or introduced from without are frequent causes. Gonorrheal pus is undoubtedly the most common cause in adults. That the vagina may become infected it is necessary that the epithelium have suffered injury or that stagnant secretions remain in contact a long time. Inflammatoty action and infection may also be spread by contiguity of surface from the cervix or vulva.

The exanthemata are held accountable for a small share of the cases.

Varieties.—Vaginitis may be conveniently considered under the following heads: Simple, Gonorrheal, Granular, Adhesive, Emphysematous, Vesicular, and Cystic.

Fig. 126.

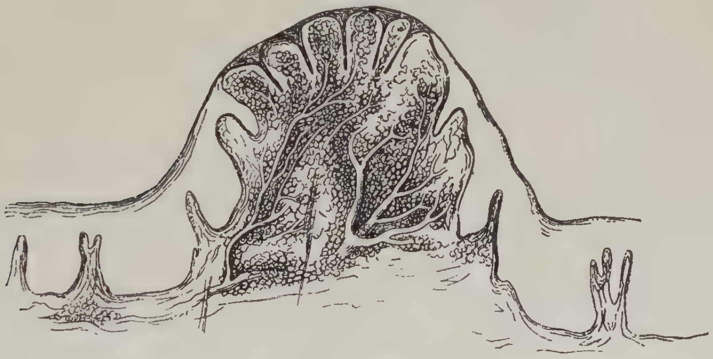


Simple Vaginitis.

Pathology.—*Simple* and *Gonorrheal Vaginitis* in the *acute* form present the following changes: hyperemia, with redness, dryness, and swelling of the papillæ; serous secretion, rapidly becoming purulent; small-celled infiltration of the epithelial structure; and some shedding of epithelial cells. If the disease last for some time, the deeper layers may become infiltrated, with loss of epithelium in places. In the beginning the changes may be confined to isolated spots. When caused by chemical irritants, such as strong solutions of iodine, a sort of vesication may occur, with exfoliation of large layers of epithelial tissue looking like false membrane. As the vaginal epithelium has the power of resisting the invasion of the gonococcus, gonorrheal vaginitis is the result of a mixed infection.

In the severer cases, and particularly acute attacks engrafted upon chronic inflammation, in the hyperemia dependent upon pregnancy, or other disturbing influences, the papillæ undergo the same changes, but to a greater degree. The epithelium is exfoliated, and the enlarged papillæ resemble a mass of granulations, giving rise to the name *Granular Vaginitis.*

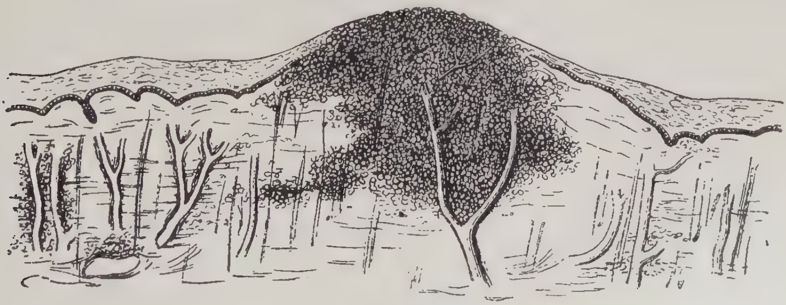
Fig. 127.



Granular Vaginitis.

In children and in old people, in whom the papillæ are smaller and the epithelial layer thinner, the inflammation is usually found more in patches, the secretion scanty, the surface smoother, and often ecchymotic in spots. The epithelium is shed in places and the surfaces may be glued together. We then have *Adhesive Vaginitis.*

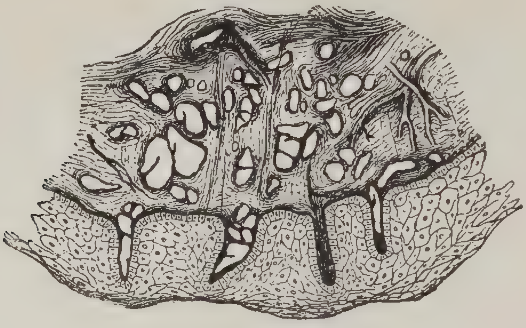
Fig. 128.



Adhesive Vaginitis.

Emphysematous Vaginitis is an inflammation of the vagina attended with development of gas in small spaces and canals of the connective tissue and lymphatics at the upper end of the vagina, and usually in pregnant women. They project like little bladders on a raised hyperemic base, and collapse when punctured. Desquamation or ulceration may result.

FIG. 129.



Emphysematous Vaginitis.

In *Vesicular Vaginitis* round vesicles form over the inflamed areas, and after bursting leave sharply-defined raw surfaces about the size of a split pea.

Follicular Vaginitis, consisting in enlarged inflamed follicles about the vaginal fornices, where the membranes may be supposed to possess more the character of a mucous membrane than lower down, is said to occur occasionally during pregnancy and in middle and advanced age. Whether the little nodules observed are really enlarged follicles or not is still a matter of controversy.

The older authors describe vaginitis as an inflammation of a mucous membrane, but the tendency now is to look upon it as more of the nature of a dermatitis, and thus some confusion as to nomenclature still exists.

SYMPTOMS.—In acute vaginitis the patient complains of a burning pain in the vagina, usually a frequent desire to urinate, with dysuria, and more or less itching and burning pain about the vaginal entrance. There is also a feeling of heaviness about the pelvis, backache, and a very slight rise of temperature. A general feeling of malaise, a loss of appetite, and perhaps nausea, are sometimes noticed; sometimes irritability and indications of hysteria, and sometimes no general symptoms whatever.

In the beginning there is a dryness of the parts, followed in a few hours by a sero-purulent discharge which tends to produce irritation externally.

In chronic cases the symptoms are similar, although less pronounced, and may be absent altogether.

Diagnosis.—Upon inspection the vagina is found to be swollen and deeply reddened, either throughout or in spots, and presents the characteristics described in the paragraph upon the pathology. The discharge is white, pale green, or yellowish, and abundant, and may be thick and slimy in character from admixture with cervical mucus.

Prognosis.—When promptly treated, the prognosis is decidedly favorable. When neglected, the consequences, particularly in the septic forms, are often serious. It may become chronic, result in ulceration, adhesion, cicatricial contraction, or spread to the uterus, Fallopian tubes, ovaries, and peritoneum.

Treatment.—The indications in the treatment of acute vaginitis are to avoid and to relieve irritation, and to secure cleanliness. The patient should be kept quiet (not necessarily in bed), somewhat restricted as to diet, and the stools kept soluble. Walking, sexual intercourse, and scratching the parts must be interdicted.

The great source of irritation is found in the infective matter and the character of the discharges. These must be removed as well as possible from contact with the vaginal membrane. Constant irrigation of the vagina would accomplish this, and, but for the trouble and irritation attending its use, would be recommended with the expectation of curing the case (if treated in the beginning) in from two to six days. A copious vaginal douche, continued for fifteen minutes, of a hot (½ of 1 per cent.) saline solution or saturated solution of boracic acid, used in the recumbent position every two hours by day and every four hours by night, answers equally well, except that it may take longer to accomplish the desired result. It should be kept up in this way for a week, and used four times a day and once at night for another week or until a cure is obtained. If the disease have lasted several days, as is often the case, before the treatment is commenced, a mild antiseptic or astringent douche may be required during the second and third week, such as 1 : 3000 solution of mercuric bichloride, a ½ of of 1 per cent. solution of acetate of lead, sulphate of zinc, or carbolic acid. If the disease shows a tendency to become chronic, the strength of the solution may be doubled. In no instance should an astringent vaginal injection be used during the first few days of acute vaginitis.

In cases in which so much douching is not well tolerated or is not available, the disease can be rapidly cured by the dry pack, used as follows: The vagina is first thoroughly douched out with the saline solution. Then the patient is put on the left side, a Sims speculum is introduced, and the cervix and vagina thoroughly swabbed out with a 1 : 2000 solution of mercuric bichloride and thoroughly dried with absorbent cotton. If the vagina be excessively tender, the bichloride solution need not be used, for it is necessary to avoid irritation. After drying out the parts the vagina should be loosely packed with sterilized plain or borated absorbent cotton, packing first the fornices and then the lower parts of the canal as the speculum is withdrawn. A dry absorbent dressing should be worn over the vulva and changed by the patient every two hours. The douching, disinfection, and packing should be repeated morning, noon, and night for the first two or three days, and after that twice a day for a week. As a precaution against return, a 1 per cent. carbolic-acid douche, or, if not well borne, the saline or boracic-acid solution, should be used every eight hours for a week or two longer. Attention should be given to septic urethral or cervical discharges, or the vagina may constantly become reinfected.

Rectal suppositories or medication should be carefully avoided, as there is danger of infecting the bowel. In case such infection occurs, the rectum should be thoroughly washed out every three or four hours with the saline solution by means of a return tube. Forcible dilatation of the sphincter ani adds to the efficiency of the treatment. The bowels should be moved once or twice daily by salines.

Morphia with atropia, or chloral may be required in nervous patients to secure quiet and sleep at night.

In *chronic* cases attention should be given to general conditions that might favor the local irritation, to external sources of irritation, and especially to conditions that favor pelvic congestion, whether they lie within the body or in the habits and external surroundings.

Large antiseptic douches, such as 1 : 2000 bichloride of mercury, should be used two or three times daily. Every four to six days the vaginal fornices may be swabbed out with a 2 per cent. solution of nitrate of silver in the tincture of iron, and a loose vaginal tampon covered with vaseline left for twenty-four hours. Treatment by dry powders, such as equal parts of subnitrate of bismuth and prepared chalk, or of tannin and iodoform, kept in place by a cotton tampon, is used by some gynecologists. The powder should be renewed every day, having the tampon removed and the old powder thoroughly douched out just before the treatment.

In the senile and vesicular forms mild antiseptic douches are indicated, supplemented by strips of lint soaked in a 5 per cent. carbolized oil or smeared with 5 per cent. carbolized oxide-of-zinc ointment, or, in sensitive cases, of cold cream or almond oil kept in the vagina.

In giving douches for vaginitis it should be remembered that there are many folds and irregularities that hide and retain the secretions; hence it is well to have the patient lie on the back with the hips elevated on the bed-pan, so that the vagina will be well filled. The bag of the fountain syringe should be considerably higher than the patient and the nozzle introduced well up toward the fornices. Tampons are best placed with the patient in the knee-chest position.

Cystic vaginitis is best treated by puncture of the small cysts about the cervix, and the application, after their evacuation, of the tincture of iodine. A vaginal douche of a 1 : 2000 solution of mercuric bichloride should be used twice daily.

In hospital practice, where there is always some one in attendance to give the douche, a bulb is preferable to a fountain syringe because the water can be pumped into the vagina with more force, and thus dislodges the secretions better.

NEOPLASMS OF THE VAGINA.

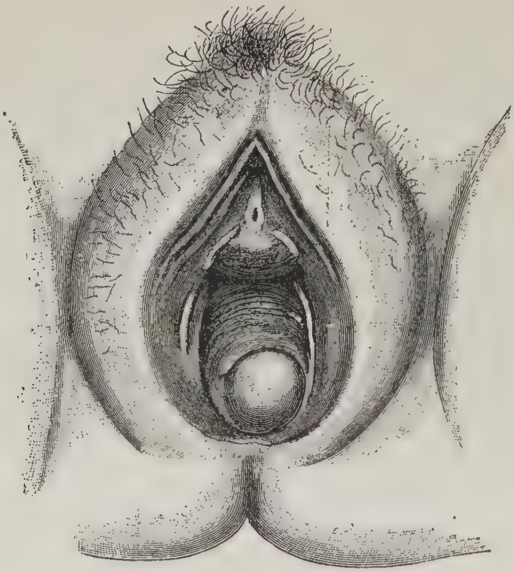
Vaginal Cysts.—Vaginal cysts, excluding cystic vaginitis, are sacs of fluid contained in or just beneath the vaginal wall, varying from the size of a marble to an egg, although if not interfered with they may attain a much larger size. The fluid is usually thin and transparent, but occasionally slightly viscid and turbid. The cyst-wall is intimately connected with the surrounding tissues and usually lined with cylindrical epithelium. Pavement epithelium has been found in a few cases. The cysts may be situated in any part of the vagina and occasionally assume a polypoid character.

Recent investigators attribute them to an embryonal origin.

Accumulations of fluid in the partly-obliterated canals of Gaertner or ducts of Müller, particularly the former, are supposed to produce them.

They give rise to but few symptoms until they have attained sufficient size to press upon the vaginal entrance and cause a sense of discomfort and pressure, and perhaps some leucorrhea. They may then assume the appearance of a prolapse of the vaginal wall. Where a prolapse is in process of formation, a vaginal cyst may go far toward determining the result.

Fig. 130.



Cyst of the Posterior Vaginal Wall.

The DIAGNOSIS is easy. When on the lateral vaginal walls, they are felt as hard elastic bodies that yield a thin transparent fluid upon aspiration. When situated upon the anterior wall, they may be recognized by putting a sound in the bladder and a finger in the vagina; or when on the posterior vaginal wall, by the fore finger in the rectum and the thumb in the vagina.

The TREATMENT consists in excising a part or the whole of the cyst-wall. When situated low down, they can easily be dissected out of their bed and the wound sewed up with buried catgut sutures. When situated higher up and complete excision is impossible, a portion of the cyst-wall should be excised, the remains painted with tincture of iodine, and packed with iodoform gauze.

Fibroid Tumors of the Vagina.—Fibrous and myomatous tumors seldom grow from the vaginal walls. True fibro-myomas, however, are not infrequently met with. They may be situated in the vaginal walls the same as vaginal cysts and of the same size, or they may become pediculated. They present the same symptoms and feel much the same as the cysts, except that they are not as elastic, and they do not yield fluid to the aspirating needle. As they grow larger the surface may ulcerate, or as a polypoid fibroid is extruded from the vulva the capsule may undergo necrosis. Sometimes they are quite œdematous and soft.

The polypoid growths may be simply cut off and the pedicle ligatured if necessary. The intramural tumors should be enucleated and the bed sewed up, as after excision of a vaginal cyst.

PAPILLARY EXCRESCENCES.

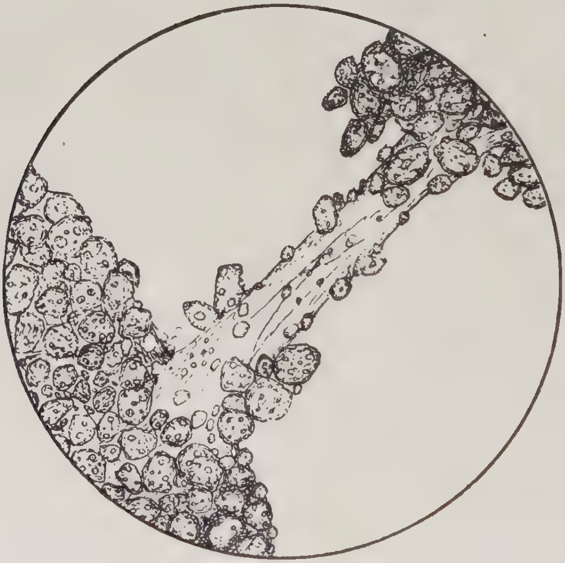
Small papillary growths of non-malignant character are sometimes found on the inflamed vaginal mucous membrane. They consist of a proliferation of connective tissue and epithelium. They are insensitive, but give rise to an irritating and somewhat offensive discharge. Sometimes they bleed quite profusely.

They should be obliterated by a strong astringent or caustic application and the vaginitis treated by the ordinary remedies.

INFLAMMATORY DISEASES OF THE UTERUS.

Anatomy.—It is essential to a proper understanding of the various forms of endometritis that a short description of the anatomy of the endometrium be given. The internal os fairly well divides the lining membrane of the uterus into two very different and dissimilar portions. The corporeal endometrium begins here, lines the whole inside of the body of the organ, and extends, modified, into the openings of the Fallopian tubes. Its characteristic features are these: it is firmly attached to the muscular tissue by a stroma of connective tissue. From this latter radiates a fibrillar tissue in no certain arrangement, which is found in lymphoid structures only. Attached to these delicate bands and between them are innumerable lymphoid cells of various sizes. This arrangement persists throughout the membrane up to the epithelial covering. This covering is of cylindrical cells, ciliated, but one layer in thick-

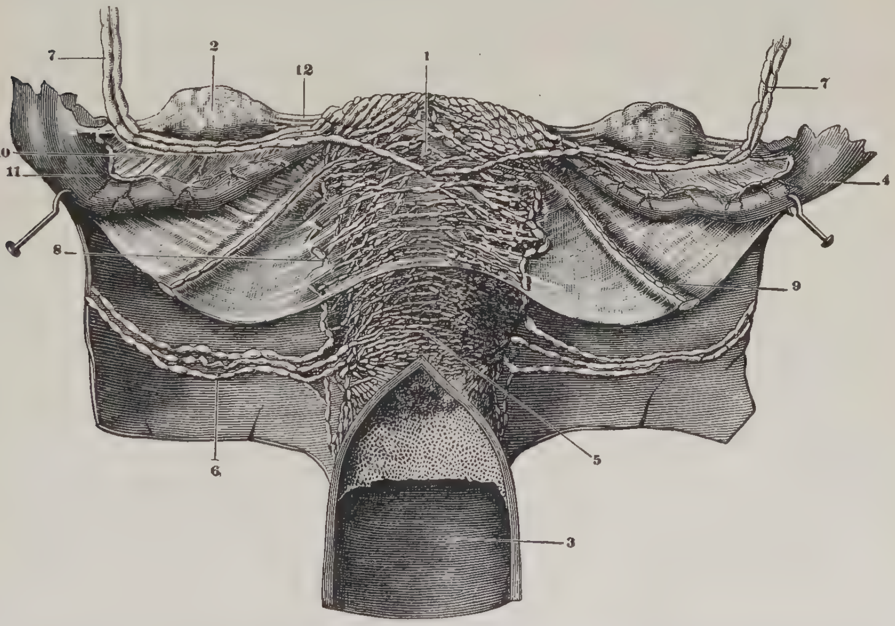
Fig. 131.



Fibre of the Endometrium, showing different grades of corpuscular development.

ness, and lines the utricular glands. These latter are merely deep depressions, with perhaps branches dipping down into the lymphoid tissue. (See Fig. 85.) There are also lymph-spaces in the mucosa. They extend from the mucosa to the spaces between the bundles of muscular fibres. The lymph-vessels are most abundant in the external muscular layer, are connected with the lymph-vessels of the mucosa and serosa, and run into large canals at the side of the uterus. The serosa has lymph-vessels only, arranged in a network, and, while less numerous than those in the subserous tissue, they are much larger. Thus the lymph passes from the mucous membrane lymph-spaces into the spaces and vessels of the muscularis, surrounds all the muscular bundles here, up to the serous coat, *and then passes into large tubes in the broad ligaments.* The uterine mucosa is, then, either an open lymphatic gland or a lymphatic surface intersected by blood-vessels, the lymphatics being not mere vessels, but spaces between the bundles of connective tissue.

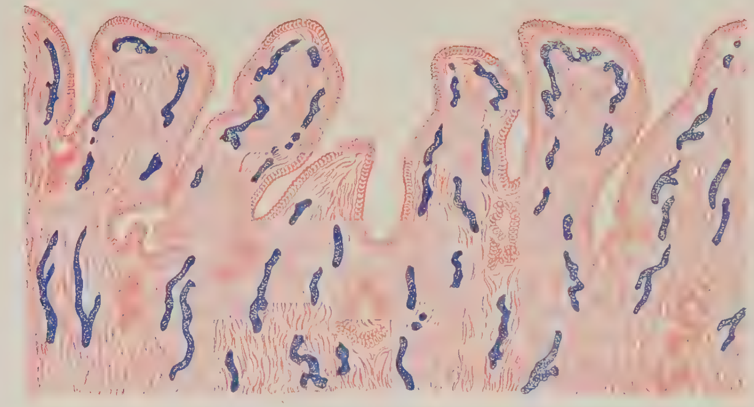
Fig. 132.



Lymphatics of the Uterus: 1, lymphatics from the body and fundus of the uterus; 2, ovary; 3, vagina 4, Fallopian tube; 5, lymphatics from the cervix; 6, lymphatic vessels from the cervix going to the iliac ganglia; 7, lymphatic vessels from the body and fundus going to the lumbar ganglia; 8, anastomosis of cervical and uterine vessels; 9, small lymphatic vessel in the round ligament going to the inguinal glands; 10, 11, lymphatic vessels of the tubes which empty into the large lymphatic vessels from the body of the uterus; 12, ovarian ligament.

The mucous membrane of the cervix is dense, hard, free from lymphoid elements, and is a true mucous membrane. It rests on a submucous structure of connective tissue. The glands are numerous and of the compound racemose type. The membrane is thrown into interlacing folds (*arbor vitæ*), and is covered by a columnar epithelium, in places ciliated, but on its vaginal aspect the covering is of squamous epithelium. The lymphatics of the cervix are not so numerous as in the body, and do not enter the broad ligaments. but, joined by those from the upper part of the vagina, pass backward to the iliac glands and those in the obturator space.

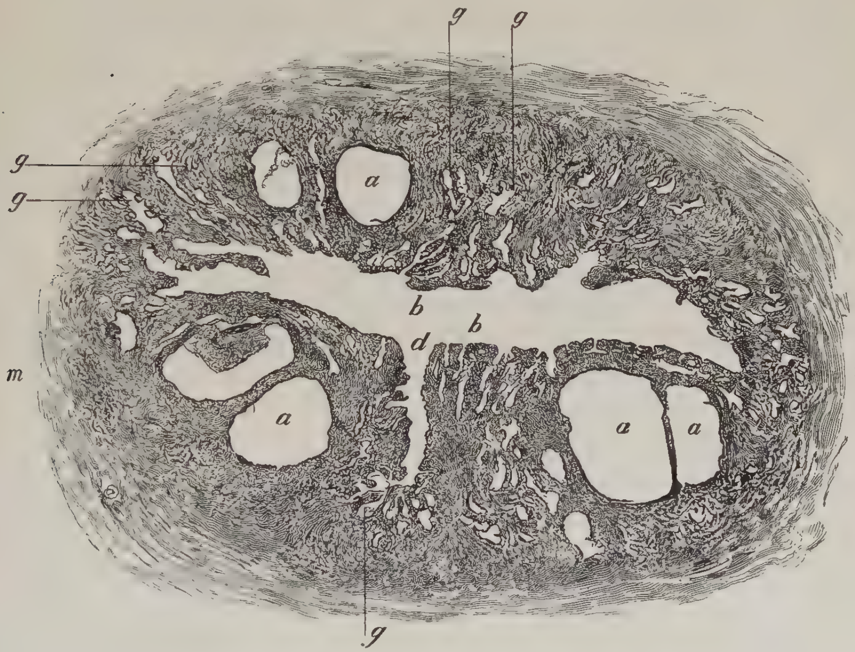
Fig. 133.



Normal Mucous Membrane of the Cervix. The mucous membrane of the Cervix is very firm and presents a number of branching folds (arbor vitæ). The interglandular tissue, which has, in the body of the organ, the nature of granulation tissue, is here of a connective-tissue type, the fusiform and stellate cells predominating. There is not the same clear limit between membrane and muscular coat: one can follow the glands deeply inward, among the connective-tissue bands, which separate the muscular bundles. Consequently the mucous membrane in section has a partly reticulated, partly fasciculated appearance. The cervical membrane possesses, moreover, many vascular papillæ. Cylindrical ciliated epithelium invests the glands in the adult, and in the child extends to the external os. In the adult, especially after pregnancy, the flat vaginal epithelium rises higher and lies more or less within the cervix. Between the superficial cylindrical epithelium and the glands, cup-shaped and colloid cells are here and there present. The vessels pass into the mucous membrane perpendicularly and have very thick walls, dividing progressively into a capillary plexus, which is less developed than in the body. Sometimes the capillaries lie very superficially under the epithelium, reuniting to form veins, which at once leave the mucous membrane. The glands and ovula Nabothi are surrounded by the vessels.

Physiology.—A certain force, the origin of which is not known, operating through the vaso-motor nervous system, causes periodically an increased flow of blood to the uterus, producing thereby a wonderful series of changes. These consist of a great increase in the number of lymphoid elements in the mucosa, exfoliation of the epithelium covering the membrane and part of that lining the follicles, and rupture of the capillaries. Thus is produced the menstrual flow. The circulatory pressure subsides, the capillaries heal, a new epithelial covering to the surface and glands is produced, and the excess of lymphoid cells is absorbed, this repair and waste occurring once in the month. There is no exfoliation of the mucosa, and the above changes are limited to the corporeal endometrium. The follicles of the uterus secrete a more or less milky fluid, somewhat viscid, alkaline in reaction, and free from pathogenic germs. Normally this secretion from the utricular follicles is so slight as not to be noticeable. The uterine secretion contains germs of no kind. It is similar in this respect to the gastric secretions. The glands of the cervix secrete in abundance a tenacious mucus. Germs are constantly present in the cervix. The cervix is solely for the purpose of acting as a sphincter to the uterine muscle, and its membrane is not involved in the menstrual act. Its secretion is clear, like white of egg, very tenacious, and abundant.

Fig. 134.



Transverse Section through the Upper Part of the Cervix, showing the Entire Mucous Membrane. The Central Cavity is the cervical canal: *b*, *b*, Internal Surface of mucous membrane, presenting small folds, superficial glandular depressions, and large incisions of the arbor vitæ (*d*); *g*, *g*, deep glands; *a*, *a*, ovules of Naboth; *m*, *m*, muscular tissue of the uterine wall.

The endometrium is solely for the purpose of forming the placenta.

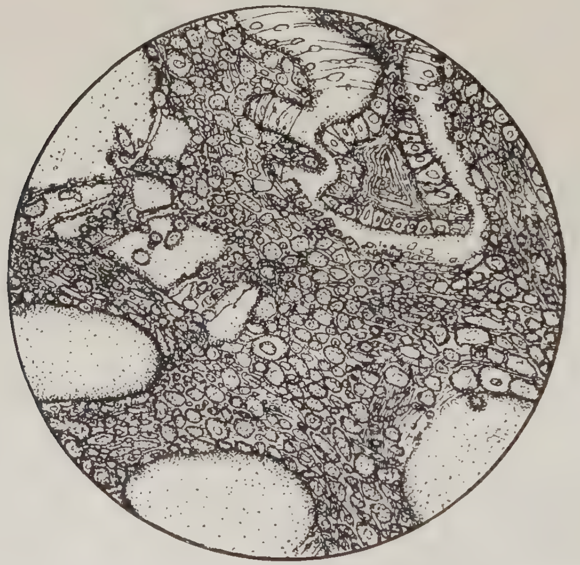
Menstruation is merely that, periodically, the uterus gets into a condition more propitious for conception than at other times. The menstrual blood escapes, as it does in apes, because the uterine mucosa is of such dense character, compared to that of other animals, that its lymph-streams are not of sufficient size to carry off all the products of the monthly engorgement.

The escape of an ovule, exfoliation of the epithelium from the surface of the endometrium, engorgement of the endometrium with blood, and multiplication of lymphoid cells, are the factors which are, invariably, necessary on the part of the woman, that conception may take place.

The lymphoid cells produce the decidual cells, and, by them, reproduction of the mucosa is brought about, after its removal; lymphoid cells also form the new epithelial layer.

In the endometrium of the child there are few corpuscles, abundant fibrillar tissue, and the follicles are mere dimples. In the fully-developed woman the corpuscles crowd the tissue and are of all sizes. The whole membrane appears to be made of them. The glands branch, dip deep into the lymphoid tissue, and are lined with cylindrical ciliated epithelium. In old women there is nothing left save fibrillar tissue, a few corpuscles, and wasted utricular follicles. Between these extremes may be found all gradations, and in the same uterus at different times the arrangement and condition of vessels, epithelium, glands, and corpuscles so vary as to constitute essentially a different organ, under the influence of the controlling factors, menstruation and gestation. Inflammatory processes, then, imposed upon these widely dissimilar states, furnish a great variety of pathological appearances, and will culminate in some one of a great variety of microscopic changes. There-

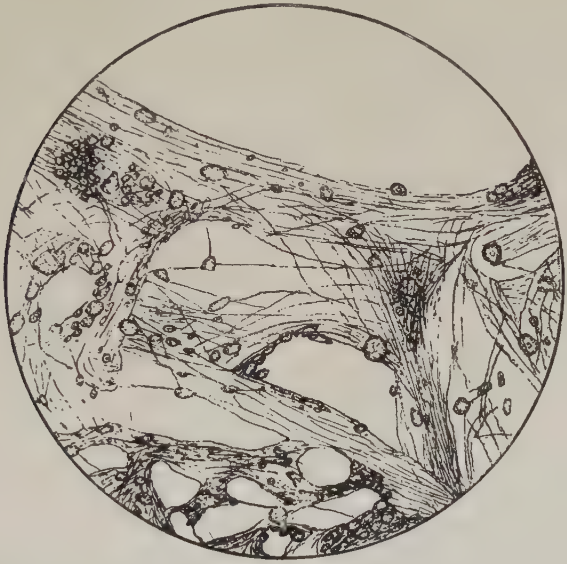
Fig. 135.



Menstruating Endometrium of a Woman aged 20, showing Utricular Follicles denuded of Epithelium, with one still containing an Epithelial Cast.

fore, we must not expect every inflamed uterine mucosa examined to exhibit characteristics identical with some known standard. As the conditions under which inflammation may occur are many, so must be the pathological changes.

FIG. 136.



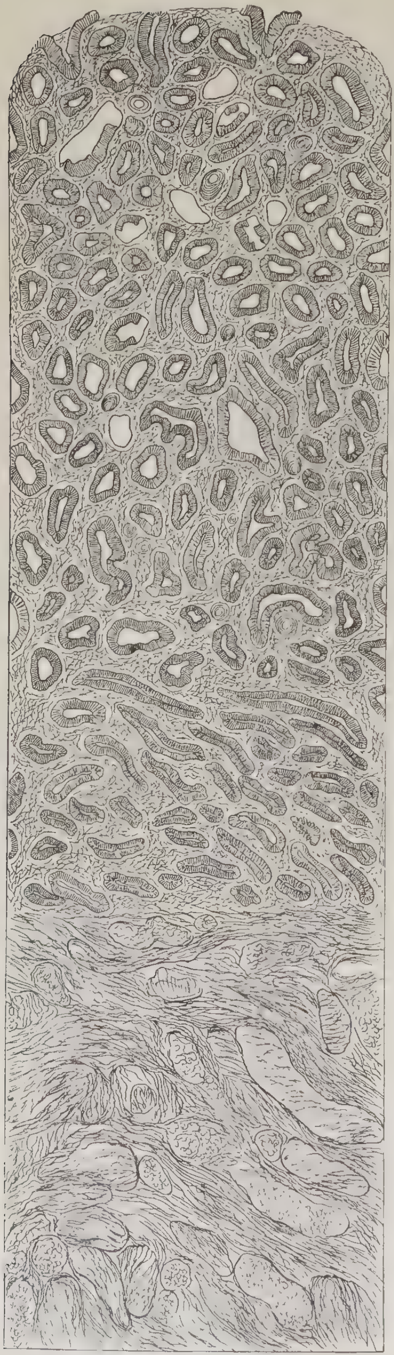
Endometrium of a Woman aged 60, showing Exhaustion of the Whole Structure.

ENDOMETRITIS.

Inflammation of the endometrium should be considered from the standpoint of its etiology, and, inasmuch as the treatment is largely governed by the causation, classification according to the latter is eminently proper. Therefore endometritis may be described as simple, septic, or specific. Descriptions of endometritis based upon the symptomatology and classed by authors as hemorrhagic, hyperplastic, etc., are confusing, and are merely different phases of the same pathological condition.

SIMPLE ENDOMETRITIS.—This is usually symptomatic and never acute. The membrane may be hypertrophied or atrophied. In the *first condition* the follicles are many-branched and tortuous with thickened epithelium, which is still deposited in one regular layer. The vessels are enlarged and increased in number; the lymph-spaces are increased in size, and the muscular walls thickened. The epithelium is easily brushed off, causing bleeding; the spaces about the follicles are filled with lymphoid cells, and the

FIG. 137.



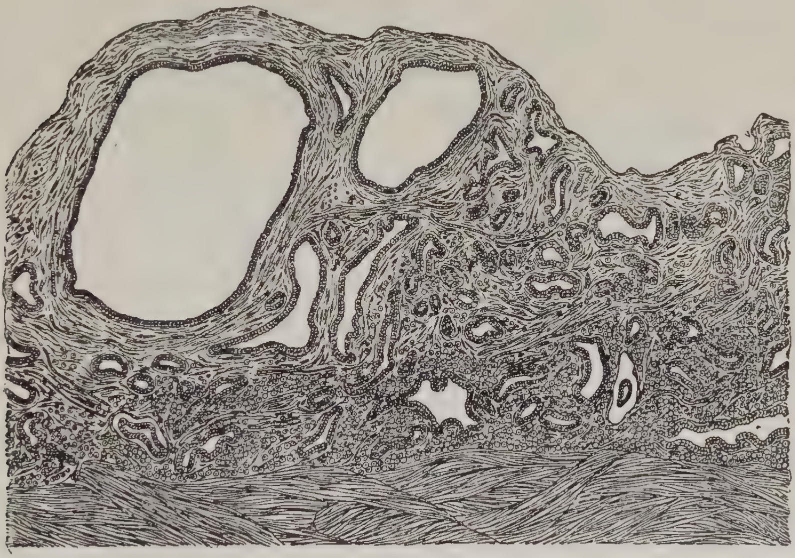
Benign Adenomatous Degeneration or Hypertrophic Glandular Endometritis.

whole general aspect is one of increased growth and excess of nutrient fluid. Should there be an increase of connective tissue and accompanying glandular hypertrophy, the condition known as "fungoid" is produced. Here the fungoid elevations are cystic and lined by cuboidal epithelium. After abortions portions of decidua may remain adherent; this is not a true product of inflammation, but rather the growth of a tissue which has partly retrograded. Hypertrophic simple endometritis is usually found associated with those lesions which are pre-eminently characterized by a general enlargement of the uterus, as in retroposition, fibroid, subinvolution,. etc.; or, glandular hypertrophy may occur, producing mucus polypi.

These polypi hang by a longer or shorter pedicle, and may even project from the cervix, although attached above the os internum. When they touch the os internum the cervix will be dilated and patulous, or even gaping open.

If the membrane be *atrophied*, the follicles with their epithelial linings are decreased in size, the lymphoid tissue is not so rich in cells, and the whole membrane is below the normal in thickness. There is an abrupt demarcation between the mucosa and the muscularis, and no intermingling of these structures. There may, in very chronic cases, be so great an increase in the connective tissue as to destroy every vestige of gland-tissues, or, constricting certain glands, cysts may be formed. This form of interstitial change is rare except in old women, but is very similar to the alterations produced by zinc-chloride and nitric-acid applications. Simple anteflexion and non-development are the chief causative factors in the condition of atrophic endometritis. The blood escaping at the menses readily coagulates, owing to the scarcity of lymphoid elements; the epithelium, instead of melting off gradually, separates in shreds or even as a whole cast. No micro-organisms are found, save, occasionally, secondary tubercle bacilli. Altered circulation by position or flexure, and consequently perverted local nerve-function, are the chief elements entering into the causation of these two very common conditions of the endometrium. They can scarcely be considered as truly inflammatory, but may at any time become actively so.

FIG. 138.

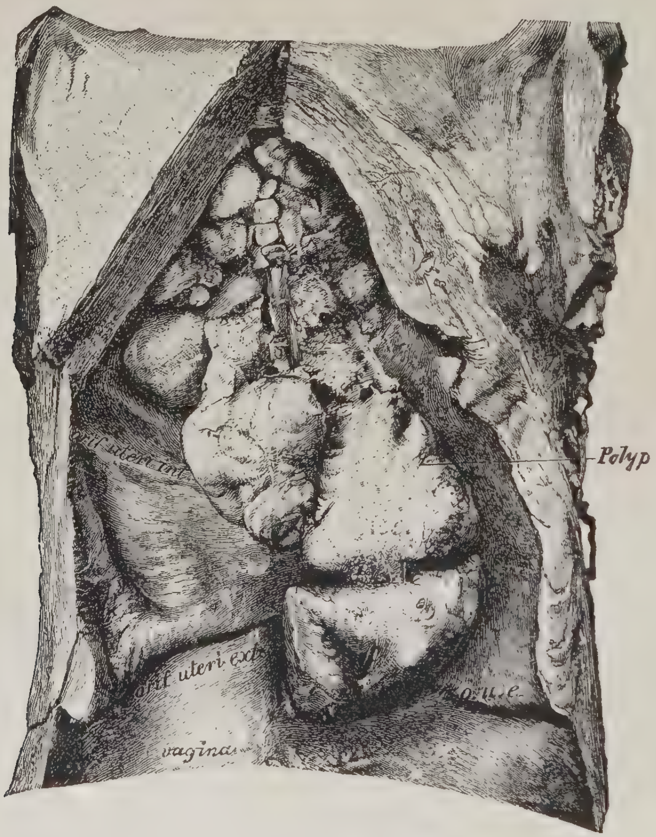


Glandular Endometritis; Polypoid Form.

This glandular endometritis when forming distinct elevations or fungosities constitutes the condition known as "benign adenoma." The only adenoma from the uterine mucosa is adeno-carcinoma, or, in plain words, cancer.

In all forms of inflammation of the endometrium the epithelial cells are deposited in but one regular row of single cells—never in layers. Beginning cancer may readily be distinguished by three things: the glands are not only increased in number, but are many times larger than the normal; the epithelium lies in layers; and the epithelial elements invade the subjacent tissues later on.

FIG. 139.



Diffuse Papillary Adenoma of the Body of the Uterus with Polypi.

Therefore, when examining curette scrapings, unless they present but one thickness of epithelium arranged about the glands as one regular layer, the case must be looked upon with suspicion.

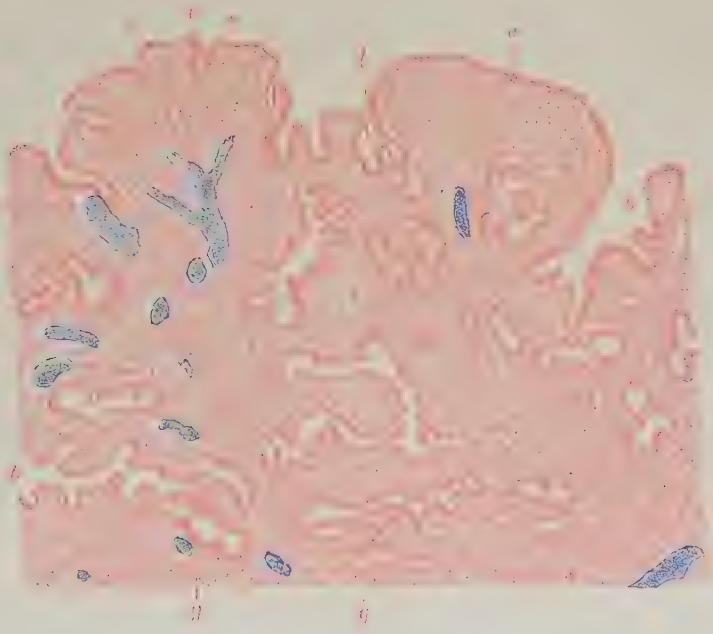
SYMPTOMS.—When the membrane is *hypertrophied*, in addition to the symptoms of the causative lesion, we have certain definite ones due to the hypertrophy alone. The menses are increased in amount, sometimes painful; the flow dark, clotted, or clear. There may also be intermenstrual bleedings. Bimanual examination reveals the gross lesion causing the condition. The sound readily produces bleeding, and frequently develops at the internal os a point of exquisite sensitiveness. The depth of the organ is increased.

The cervical flow of mucus is tenacious and usually milky in character, owing to the excessive admixture of epithelium and lymphoid cells. There is no erosion of the cervix, and the cervical membrane is not often coincidently inflamed. Menstruation is followed by a more or less persistent leucorrhea.

When the hypertrophy has gone on to the production of fungosities, increased menses, intermenstrual bleedings, and a profuse leucorrhea, often purulent, are the characteristic symptoms. The same is true when portions of decidual tissue have been retained and grown to the endometrium, thus forming buds and excrescences.

With a less degree of hypertrophy the chyle-like fluid (leucorrhea) is non-irritating and devoid of germ-life. It is composed of increased secretion, fat-globules, lymphoid cells, and epithelium, and has no odor.

Fig. 140.

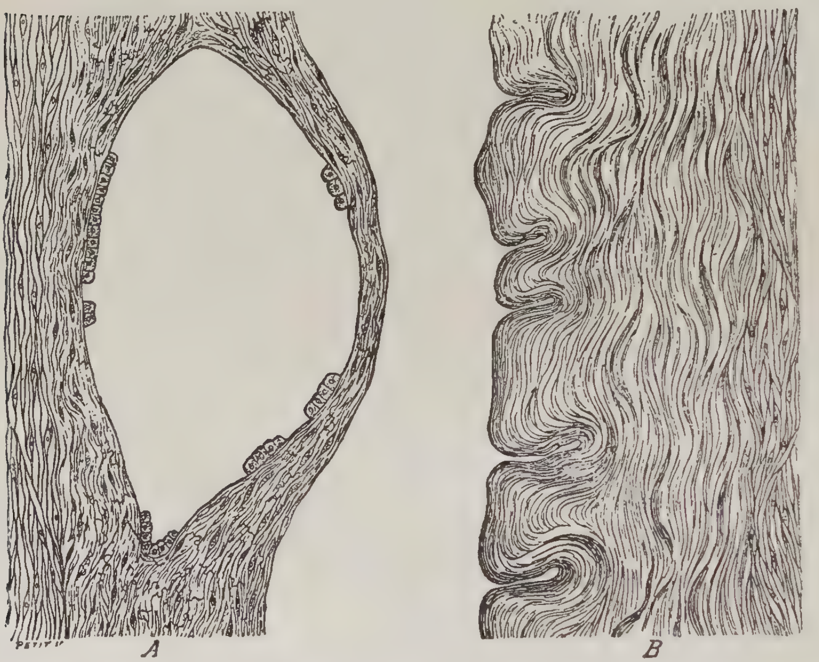


Section of a Glandular Uterine Polypus: *a*, *a*, superficial nodules covered with cylindrical epithelium: *b*, mouth of glands opening into a depression between; *g*, deeper portions of the same glands; *v*. *v*, blood-vessel.

With polypi the amount of hemorrhage produced is often so great as to suggest fibroid; and even a very small polypus may give rise to alarming floodings. The uterus always treats these growths as foreign bodies, the cervix remaining patulous and soft, and the uterine muscle making ineffectual spasmodic, attempts at expulsion of the growth, especially at the menses. Besides the intermenstrual bleedings, there may be a more or less continuous discharge of dark, coffee-colored fluid suggestive of malignant disease. There can be no question that these polypoid granules, although in the beginning perfectly innocent, will, if allowed to remain for years, take on the characteristics of malignancy, in that their epithelial elements will invade the surrounding tissues.

Always there is more or less of a purulent leucorrhea, due to colonies of cocci becoming established upon the generally abraded surface of the polypi. The rest of the endometrium may remain free from the pathogenic germs.

Fig. 141.



Interstitial Endometritis with complete Atrophy of the Glands: *A*, cystic formation, last trace of the glands; *B*, all vestige of gland-tissue disappeared.

Often it is impossible, without intra-uterine touch, to distinguish polypoid endometritis from corporal cancer. The character of the growth determined by the microscope will enable us to differentiate absolutely.

Where the membrane is *atrophied* the dysmenorrhea is often excessive. This pain precedes the flow by a few hours, is located just behind the symphysis, and is intermittent, alternating with the escape of clots. The flow is scanty or watery. There is also a slight leucorrhea. In both conditions there are digestive disturbances and reflex nervous phenomena entirely disproportionate to the changes in the endometrium. Backache opposite the last lumbar vertebra, "*bearing-down*," and a sense of weight more often accompany the hypertrophic form. Sterility results from the atrophic variety more frequently, and is directly dependent upon the altered state of the endometrium.

Treatment.—In no form of uterine disease is general treatment of so much benefit. It may even cure certain cases. Thus, a change of climate, the "rest-cure," and an out-door life, may determine such alterations in the general nutritive functions, as to relieve these patients of most symptoms. It is in these cases of chronic simple endometritis that the various springs and watering-places are of benefit, the general surroundings and change in mode of life accomplishing the improvement, by acting through the general absorptive system. The small quantity of arsenic and iron in the waters has but little effect. The dysmenorrhea and excessive flow are lessened by cannabis indica, gelsemium and hydrastis. When the mucosa is much hypertrophied, producing fungosities or polypi, with hemorrhages, the proper treatment is always to remove the entire endometrium, and, if possible, correct the lesion upon which the endometritis depends. This should be done surgically, and not by the use of powerful chemical agents. If the gynecic surgeon will keep clearly before him the fact, that there is but a little tissue between the endometrium and peritoneum, rich in connecting blood-vessels and lymph-streams, if he will view endometritis from the peritoneal rather than the vaginal aspect, he can make no error in choosing the proper method of treatment. Although the inside of the uterus, in these cases, is free from micro-organisms, yet they are in the vagina. To treat patients by zinc chloride, carbolic acid, electricity or other escharotics, is to produce a more or less extensive slough, retained to become putrid, and is to create a surface deprived of that protecting epithelial covering which is the organ's sole defence against the inroads of pathogenic germs: and they do this in an unclean way, with no provision for drainage. The hypertrophied membrane should be removed with the sharp curette, as will be described. Possibly incision of the cervix, or even amputation, may be necessary to get good drainage, all of which is merely preliminary to the dilatation, curettage, and gauze packing. Atrophic simple endometritis, and the hypertrophic variety when slight, can be relieved by removing the causative lesion and treating the endometrium by gauze packing. Drainage with stem pessaries, whether perforated or grooved, is a delusion. They do not drain, but are mischievous affairs, hard to keep open and clean; and, as Wylie, the great exponent of drainage by stems, remarks, "the endometritis is apt to come back." The application of mild antiseptics and astringents to the endometrium thus inflamed is a perfectly proper procedure, but care must be exercised that with the application pyogenic cocci are not introduced. If the change in the endometrium does not warrant operative procedure, the vagina and cervix should be thoroughly cleansed, a narrow strip of iodoformized gauze introduced into the uterus, and the vagina packed lightly with the same material. In two days this is changed and a larger piece of gauze introduced, the canal being then more patulous. When this gradual dilatation has gone so far as to ensure good drainage through an open canal, there is hypertrophy of the uterus, and intra-uterine astringents are used before introducing the gauze; iodine is the preferable drug for this purpose. It is not only astringent, but germicidal, and is, moreover, not deep in its effects; its action is limited to the superficial structures only, and therefore produces no slough. The patient is not kept in bed, but confined to her room. The treatment is not painful after the first few sittings, and the endometritis is relieved in two weeks, though it will recur if the causative disease be not removed. The treatment should be begun a week after menstruation. Instead of iodine, pure ichthyol as an application may be used with good results.

The treatment of endometritis by chloride-of-zinc pencils is still practised by a number of physicians in America and abroad. This procedure causes the exfoliation of the endometrium. It does this by destroying the membrane, which is cast off by suppuration, and a simple hypertrophic endometritis is converted into a septic process by its use; at the same time, a septic metritis is set up, and salpingitis and peritonitis often follow the treatment. The pain it produces is agonizing. Nothing could be more unscientific. Even though curettage were a dangerous procedure, and the curette often thrust through the uterus, it could not produce the destructive lesions which zinc does. The same objections attach to the use of nitric acid. Not only is the treatment itself most painful, and prone to produce serious lesions of the adnexa, but it also leaves the uterus in a crippled condition. The new endometrium produced is atrophic, the uterus the seat of connective tissue changes, and menstruation incomplete, attended by great pain due to tension, and hysterical manifestations. Even Mundé, the chief advocate of the chloride-of-zinc treatment, admits its dangers; it is certain that those dangers are not to be avoided by any effort on the physician's part, but are inevitably inherent in the method.

Before making an application to the uterus, the entire field of operation should be cleansed by a solution of lysol, 1½ per cent., or of creolin, 2 per cent., scrubbing the vagina and cervix carefully with cotton pledgets held by forceps. An applicator is then wrapped with cotton and the cervical canal wiped with either of these two solutions or a carbolic-acid solution, 5 per cent., care being taken not to invade the inside of the uterus. If a probe is to be used, it should be heated in an alcohol flame to sterilize it. The direction of the cervical canal having been determined by the probe, a very fine fillet of iodoform gauze, 20 per cent., is laid over the applicator, which has been curved to the shape of the canal, and is pushed up to the fundus of the uterus. A stout silver probe, or Simpson's sound which has had its bulb cut off, makes the best applicator for this purpose. The uterus should always be gently drawn down and steadied by means of a tenaculum, to straighten its canal. The ordinary tenacula prick the membrane, cause pain, and are followed by the loss of a drop of blood. To avoid this, a very coarse double tenaculum, made like the American bullet forceps, the points being so dull that they do not penetrate the mucous membrane, may be used. A wad of iodoform gauze, the size of a silver dollar or larger, is then carefully adjusted over the cervix, and another of borated cotton is placed over this, to retain it in place. Treated this way, no odor of iodoform is noticeable about the patient, and the field of operation is kept perfectly aseptic from one treatment to the other. It is useless to do this if the patients are allowed to have intercourse or douches, or if the vagina is in any way invaded. After the treatment they may go about their rooms, and should be perfectly comfortable. It is not to be forgotten that the condition which causes this change in the endometrium must be cured. Polypi, fungosities, and retained decidual tufts are to be removed by the curette; they are not amenable to palliative treatment. Iodine is not of much benefit in the atrophic form, but ichthyol is. These latter cases often prove intractable. If they be subjected to the gauze packing for the three weeks preceding the period, and the last dressing removed three days before the menses come on, it will be found that the flow is increased in quantity, is more nearly normal in character, and the pain less severe. The same treatment may be repeated the next, and if necessary the succeeding months. After the cervix has become so dilated that it will receive a filament of gauze half the size of a lead pencil, one may rest content with the result. The uterus is not to be packed, but the gauze is gently introduced to the fundus. The cervix has the property of dilating around any foreign substance in its canal, and gauze packing of this size is amply sufficient to ensure good drainage. The results of the treatment are very satisfactory.

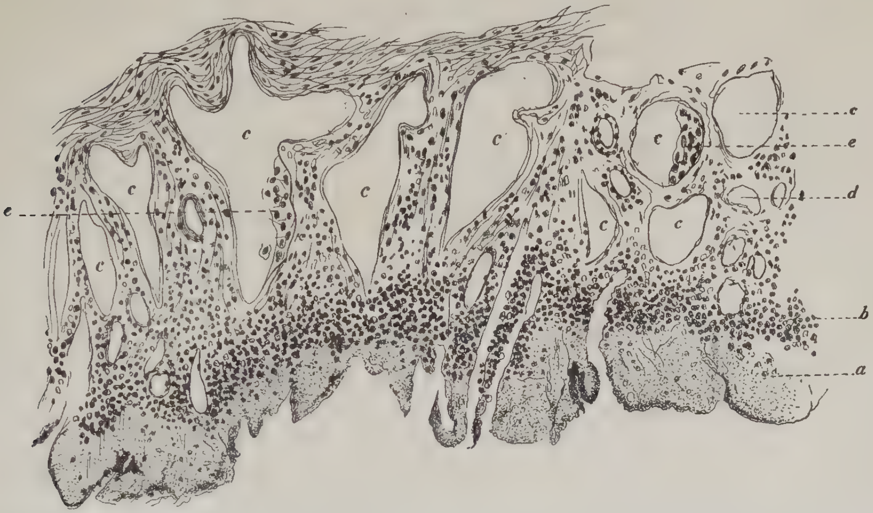
SEPTIC ENDOMETRITIS.

Septic endometritis is an infectious inflammation of the endometrium, usually caused by staphylococci, occasionally by streptococci. It may occur at any time of life and in any condition of the uterus, but it is most frequently seen during the menstrual life of the woman, being favored by that function and pregnancy. It may be chronic, but is most often seen as an acute affection. The pathology and symptoms will be modified by the condition of the uterus at the time of the attack. Infection of the postpartum uterus belongs more properly to the province of the obstetrician.

Acute Septic Endometritis.—Acute septic endometritis is caused, in the greater number of cases, by infection after abortion; many cases, however, are caused by foul manipulations of the uterus, and operations upon that organ. Inasmuch as pyogenic germs are constant in the vagina, auto-infection is possible under certain conditions, but it must be exceedingly rare. Any factor which induces exfoliation of the epithelium, such as menstruation, abortion, rough treatment, sudden congestion, exposure to cold, and the introduction of infected instruments into the uterus, puts that organ into a condition propitious to the development of infection.

PATHOLOGY.—In the acute form the uterus is enlarged and engorged with blood. The mucosa is swollen, of a deep color, and the number of vessels actually increased. In spots it may be necrotic or the whole membrane may slough. The epithelium covering the membrane and lining the follicles is exfoliated to a greater or less extent, and the vessels, present on the surface, rupture, giving rise to capillary bleedings. Pus-cells cover the surface and fill the follicles; in aggravated cases they are found also in the lymphatics and lymphoid tissue. The muscularis is of a very deep color, softened and much thickened, even in a few hours. Its lymphatics are gorged with cocci, in advanced cases, and its blood-vessels with blood. True septic metritis is present. Staphylococci are everywhere in the membrane, sometimes even penetrating the muscular walls. Rarely are streptococci found except in puerperal cases.

Fig. 142.



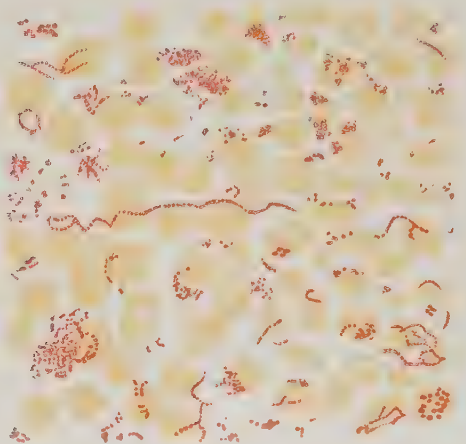
Puerperal Endometrium removed by Curettement on the Seventh Day: *a*, Necrotic layer of the decidua; *b*, zone of reaction; *c*, Sections of the glands; *d*, Sections of the blood-vessels; *e*, Remains of the glandular epithelium.

In *chronic septic endometritis* the same lesions occur, only to a less degree. There is a general reproduction of epithelium, and the more acute symptom, necrosis, is absent. Pus is produced in quantity in the glands and on the surface of the membrane. The cocci may have penetrated the muscular wall, and there formed a pus-focus even amounting to abscess. In doing this they follow the lymph-streams. Complications are most likely to accompany these conditions, and the changes due to pelvic lymphangitis, ovaritis, salpingitis, and peritonitis may be found.

Those cocci which are found present and arranged in groups are staphylococci, the germs always found in septic endometritis; those in chains are streptococci, which cause many cases of, and are found in, puerperal infection.

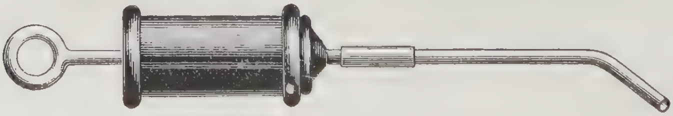
Symptoms.—The acute stage is often ushered in by a chill, especially after abortion. This is followed by severe uterine colic, which soon becomes a continuous pain. The temperature rises to a variable degree, with rapid pulse. In a few hours the uterus discharges a greenish pus or one tinged with blood. The uterine pain is severe, and the patient keeps the bed. Examination reveals the uterus enlarged and very sensitive. The parts have increased heat. From the cervix projects a rope of muco-pus, possibly bloody. If the disease has lasted a few days, the cervix is eroded, and may even be covered by a true diphtheritic membrane, the result of infection by streptococci. Some of the complications which follow this condition may be present and add to the symptoms. The acute symptoms may subside in a few days, provided the very common complications of peritonitis and salpingitis do not overshadow the symptoms of the endometritis. Thus the acute form may gradually become chronic, with few symptoms other than a little pain, "bearing-down," and a purulent leucorrhea. It is not always easy to discriminate a chronic simple endometritis from a chronic septic one, but in the latter there is the invariable clinical feature of purulent discharge from the uterus, which is not present in the former. This pus does not always appear in the cervical mucus, but it can always be obtained with the suction syringe, and it usually follows the

Fig. 143.



Cocci from an Empyema; prepared by Gram's Method.

Fig. 144.



Syringe for the removal of Cervical Secretion.

withdrawal of the sound. The symptoms of gonorrheal endometritis are very similar to those of the septic variety. In some cases the microscope alone will differentiate the two forms, which are frequently blended. No investigations have yet been made, as to the appearance of peptones in the urine in acute septic endometritis, but an examination would probably disclose their presence. Whenever pus escapes from the uterus, it is an absolute indication that pyogenic cocci are in that organ, and clinically the case is either in a septic or a specific state.

Treatment.—The radical treatment is the best: thorough and complete removal of the septic focus, irrigation, and gauze packing is recommended, as these uterine inflammations must be considered in the light of their complications. Prompt interference may cut short the disease, and save the patient those gross changes in the tubes and peritoneum which so often result from a neglected septic endometritis. If destructive disease of the adnexa has already taken place, the curettage is none the less indicated. The more acute the symptoms, the greater the indication for the operation. Some cases of chronic septic endometritis without complications *may* be cured without the use of the curette, by the introduction of drains of iodoformized gauze, but this method must be pursued with the strictest attention to asepsis. The presence of a purulent uterine discharge positively contraindicates the use of applications and stem pessaries, unless the applications be accompanied by the use of the gauze drain. The only treatment, then, applicable to acute and chronic septic endometritis, when complicated by disease of the adnexa or peritoneum, is curettage. Whether the septic condition follows treatment, operation, or abortion, whether it accompanies cancer, polypi, fibroids, or other neoplasms, yet must the septic uterus be cleaned out before any other treatment is instituted. If infection follows plastic work on the cervix, the sutures should be removed, the uterus curetted and packed. There are so many important minor details in the after-treatment of septic endometritis that they require separate attention.

When a uterus not enlarged is curetted for uncomplicated chronic inflammation, the gauze need not be removed for from four to eight days, and but one renewal is necessary. In renewing the dressings, infection is easier than at their first application, for the reason that the uterus is now divested of its protecting lining. Care should therefore be taken not to reinfect the case. The second dressing may remain from four to seven days and then be removed. All interference with the vagina, in the shape of douching, coition, and examination, should be prohibited for the remainder of the month, and the patient must take to her bed on the appearance of menstruation. When the curetting has been done on an enlarged uterus acutely infected, as after abortion—say, at the third month—the dressing should first be changed on the third day; sooner if the temperature rises or other acute symptoms appear. Subsequent dressings are made whenever the one becomes saturated. After the uterus has become entirely clean, with non-purulent discharges, the use of iodine is indicated, to overcome the existing subinvolution. This latter condition occasionally produces a simple hypertrophy of the mucosa, which will, at the subsequent one or two periods, give rise to menorrhagia. The larger the uterus the longer the treatment must be continued. After the first dressing the packing is loosely placed. The treatment is not painful. The uterus is always to be steadied by using the blunt bullet forceps, hooked into the anterior lip. After abortion at the third month, irrigation is also employed at the dressings. The larger the cavity the more elaborate the treatment. In other words, these infected uteri are treated exactly as other discharging septic cavities, only here drainage is more difficult to obtain.

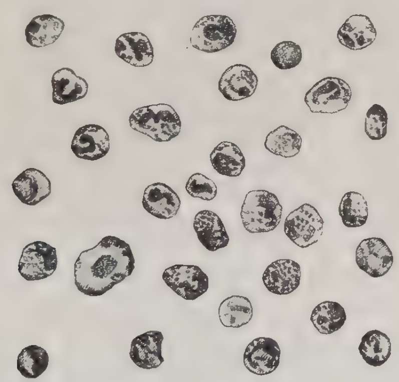
Gonorrheal Endometritis.—Of all forms of virulent endometritis, this is the most common.

PATHOLOGY.—Acute gonorrheal endometritis presents the same gross lesions as the septic form. Microscopically, we find that the gonococci penetrate but little below the surface, and are chiefly found in and under the epithelium. They follow the lymph-streams to a less extent than the staphylococci. Again, there is pus produced in true gonorrheal endometritis, but sloughing never follows this form of infection. No case has yet been reported of fatal primary gonorrheal endometritis. Systemic infection is not as severe as in the septic form. The great complication is salpingitis, by direct tissue extension from the uterus to the tubes. Chronic gonorrheal endometritis is very frequent, resulting from a subsidence of the acute form. Here the gonococci occupy the follicles and lie beneath the epithelium. They do not penetrate deeply into the mucosa, and do not extend along the lymph-spaces. Therefore they do not cause peritonitis and systemic infection except by extension through the tubes. Each menstrual period sees a greater or less increase in the invasion, and recurrent attacks of tubal disease are frequent.

Symptoms.—Possibly some one or all the symptoms of gonorrhoeal vaginitis or vulvitis are present, but they may all be absent, and the first and sole indication of infection may be the sudden onset of a virulent endometritis. There may be occasional rigors, fever, and great pain in the uterus. The temperature does not at first range high, and the initiative chill is not prominent. The pain in the uterus is of long continuance, with exacerbations. In a few hours the discharge of muco-pus appears, oftentimes tinged with blood. If there be no extension of the infection, the symptoms of profuse discharge, slight fever, and pain gradually subside in ten days or less, leaving behind merely the symptoms of chronic purulent endometritis.

The local symptoms are indentical with those of septic endometritis, but gonococci are found in the discharges.

Fig. 145.



Gonococci (two days after infection).

Although these appear irregularly grouped in the pus-cells, yet on close inspection they may almost always be seen to be arranged in pairs (diplococci), the opposite surfaces of each pair being flattened like two Ds (ᗡD) back to back. They may be in groups only, and not show this diplococcus arrangement. Their manner of staining will then prove their character.

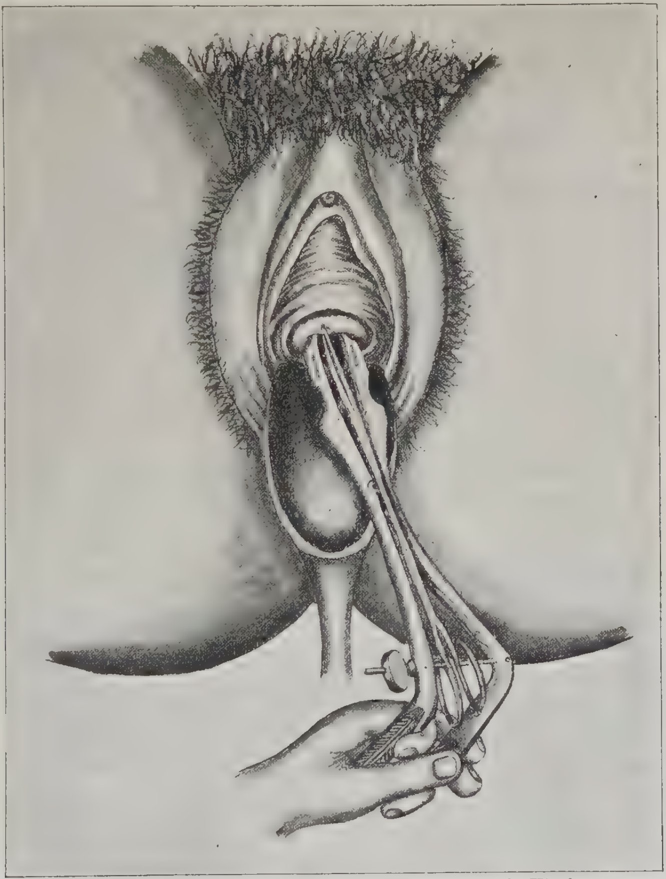
Treatment.—If seen early and before the advent of any complication, the uterus should be thoroughly irrigated with a saturated solution of boracic acid, or a bichloride-of-mercury solution, 1 : 5000; after which a drain of iodoform gauze should be introduced, and the vagina filled with the same material. In twelve hours both dressings may be removed, the uterus again irrigated, and more gauze inserted. It is easier to subdue gonorrheal than septic endometritis. If the first attempts to control the disease fail we may be sure that the infection is a mixed one. If there be the complication of salpingitis or peritonitis, the operation of curettage is necessary. The uterus is not the natural habitat of the gonococci, as the endometrium has a pronounced resistant power against them; their home is in the urethra and vulvo-vaginal glands; therefore they invade the uterus in but a small number of cases, otherwise infected.

CURETTAGE.

Curettage of the Uterus.—Admitting that in most cases pathogenic germs exist in the vagina and the cervical canal, the right does not lie with the surgeon to suppose the endometrium exempt in any given case of inflammation. Therefore a method must be adopted which presumes they are present in all cases. The instruments necessary for performing a curettage are—a speculum, double tenaculum, intra-uterine catheter, blunt-pointed bistoury, uterine-packing forceps, heavy applicator, curettes, uterine dilator, fountain or bulb syringe, and an intra-uterine packer. The operation is best done with the patient in the lithotomy position, and with Kelly's pad placed under the hips. The lithotomy position is preferable to Sims's, as irrigation is easier and at any stage of the operation a bimanual examination may be made. The solution for irrigation is preferably a saturated solution of boracic acid, but bichloride of mercury 1 : 4000, or even boiled salt-solution (7 : 1000) except in septic and specific cases, will answer. For cleansing the vagina laundry soap and a 10 per cent. creolin solution, or a 1½ per cent. lysol solution, with a long-handled brush (sterilized), will suffice.

By pushing the brush in and out, turning it, scrubbing here, then there, the vagina may be rendered aseptic. While engaged in using the brush, irrigation into the vagina may also be made. Too much stress cannot be laid upon this cleansing, and it should be as thorough as possible, going over and over the field, time and again. The vaginal canal should be scrubbed in this way whenever an operation is performed upon or through it. In septic cases especially must it be thorough. The instruments to be used must be boiled in a solution of washing soda (3 per cent) for fifteen minutes. The instrument pans should contain a 5 per cent. carbolic acid solution. Gauze may be prepared in a few minutes by boiling, wringing dry, and impregnating with as much iodoform powder as it will take up. It is not easy to make, however, and many firms furnish a fairly reliable quality. Always before using commercial gauze, it should be soaked in bichloride-of-mercury solution 1 : 4000. The field of operation should be covered by sterilized towels and the operator and assistants prepared as for cœliotomy. Instead of sponges, swabs of borated cotton wet in bichloride-of-mercury solution, are used. Any stiff dilator will answer the purpose, but those with screws should be employed carefully, for the blades are apt to tear the tissues, as the screw renders it impossible to relieve the pressure until too late. Goodell's instrument is a proper one. The vulva having been shaved, the patient cleansed and in position, the speculum is introduced and held by the assistant on the patient's

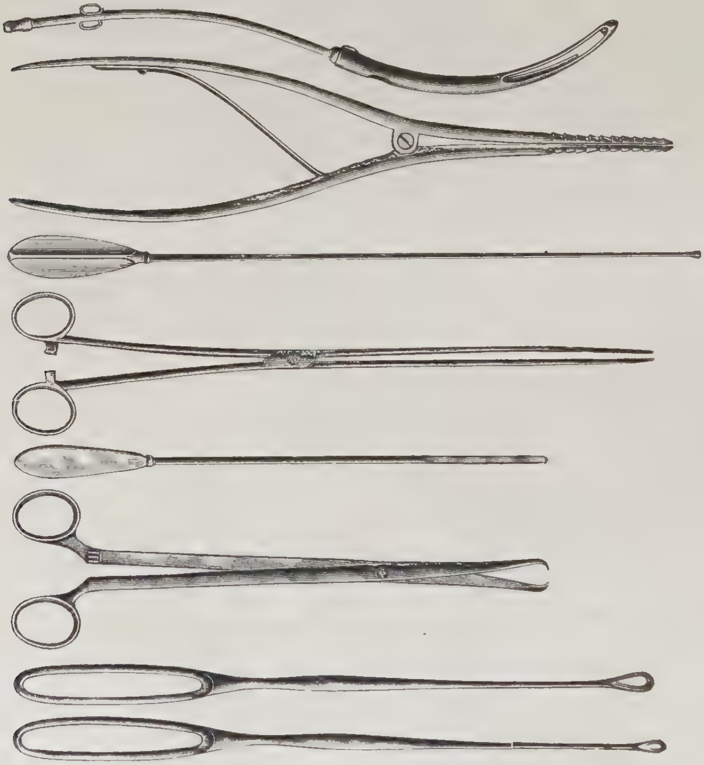
Fig. 146.



Instruments in Position for Dilatation of the Cervix Uteri.

right. The anterior lip of the cervix is seized with the double tenaculum, pulled down as far as desired, and given in charge of the same assistant, whose left hand rests on the pubic bones. In this way the uterus is held immovable. By bimanual palpation the size and position of the uterus are determined. The cervix should be cautiously dilated bilaterally, the grip relaxed, the dilator turned a little, and dilatation made in the new position of the instrument; in this way, by alternately dilating around the entire circumference of the cervix, the canal will be readily and safely dilated to an inch or more, several authorities to the contrary notwithstanding. It must not be forgotten that we are working in undeveloped unstriped muscular fibre, to overcome the force of which, too sudden pressure must not be used. Dilatation by graduated sounds is not advisable, inasmuch as the pressure is made against the hold of the tenaculum, and either insufficient dilatation is made or the tenaculum tears the tissues. Under any circumstances the

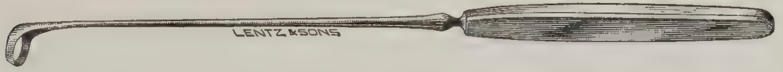
Fig. 147.



Instruments for Curettement of Uterus.

traumatism induced is much greater than when the steel instrument is used as described. Besides, the dilatation obtained is not sufficient to destroy the action of the local sympathetics, upon which depends the uterine colic and the expulsion of the dressing, as observed and complained of by those who use the graduated sounds. After dilatation the uterus should be washed out by means of the catheter, or the small nozzle of the bulb syringe, followed by the use of the curette. As large an instrument as can be introduced should be used. Gently introducing the curette, it is withdrawn, its cutting face downward, and by reintroductions and withdrawals the whole organ is systematically scraped. The small size is then used, if the uterus be firm, and the openings of the tubes and lateral angles scraped. The instrument is then turned so as to curette the fundus by a sweep from side to side. The danger from curettage lies not in the proper use of the instrument, but in introducing it roughly and with force. The instrument should be held as is a pencil, and used with a delicate touch. Blunt curettes are useless for this work. If a surgeon must use such because of the supposed danger attaching to the sharper instrument, it is questionable whether he should do the operation at all. Again, and this is important—the dull curette scrapes off only the epithelial and softer external portions of the mucosa. Thus its use may be harmful; for if a septic infection be local, and the epithelium of the rest of the organ has sufficient resistant power against the cocci, the procedure but removes this sole protection against a general infection without going sufficiently deep to remove the cocci, and thus creates for the germs a new field for extension. So it is manifest that in septic cases, at least, the fancied safety of the dull curette, apart from its inefficiency, is a delusion. The object of the operation is to remove the entire endometrium, so that the cytogenic embryonic uterus may produce a new one under propitious circumstances. Following the curet-

Fig. 148.



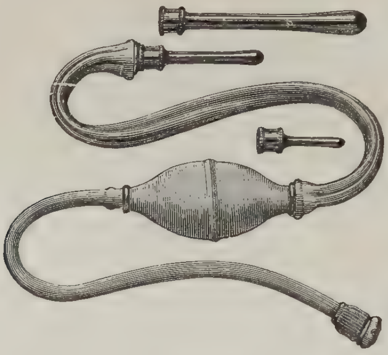
Sharp Curette.

Fig. 149.

Uterine Applicator.

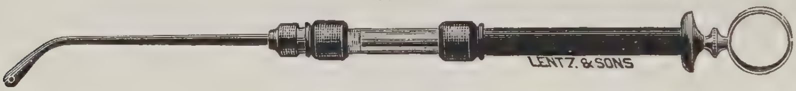
tage, the uterus is to be thoroughly irrigated again. If the organ is much hypertrophied, the entire cavity should be swabbed out with tincture of iodine on an applicator, or the application made by means of the intra-uterine syringe.

Fig. 150.



Bulb Syringe.

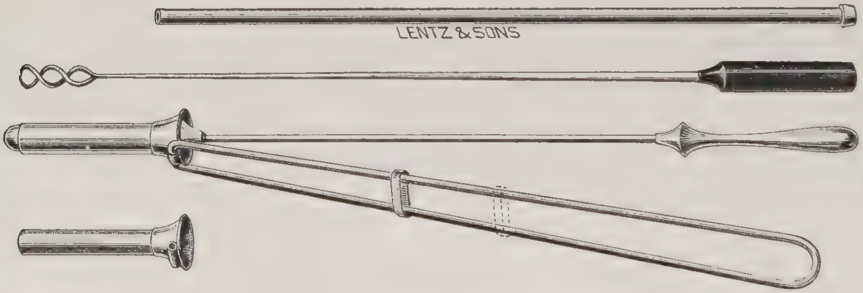
Fig. 151.



Braun's Intra-uterine Syringe.

Uterine Tamponade.—The field of work being covered by clean sterilized towels and the hands washed, the gauze is introduced in one long strip. If the cervix be thoroughly well open, the gauze may be gotten in with the packing forceps. It is usually, however, impossible, on account of friction, to tampon the uterine cavity except through an intra-uterine speculum, in which case it is first necessary to dilate the cervix. The uterus should be packed as tightly as possible, and the end of the gauze left projecting from

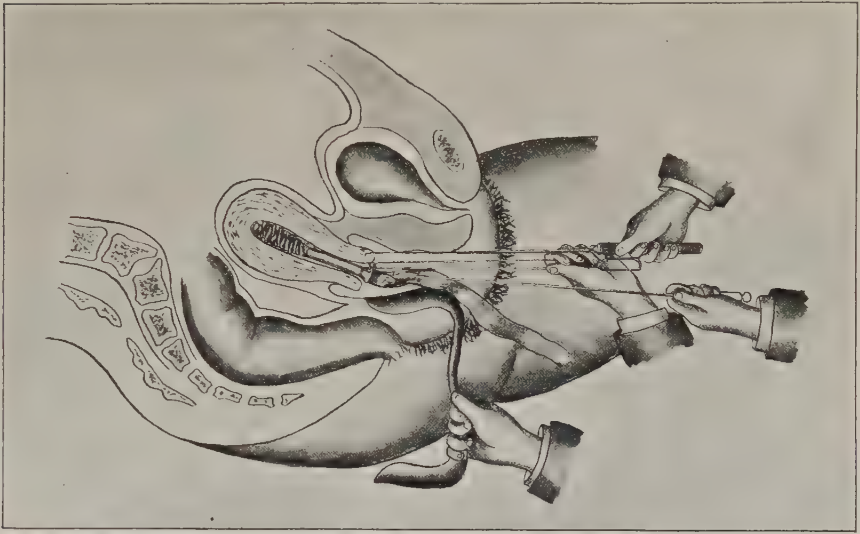
Fig. 152.



Instruments for applying the intra-uterine tampon.

the cervical canal. A light dressing of gauze is then applied to the vagina. The patient should not be allowed to soil the dressings with urine if it can be avoided. After each urination or movement of the bowels, bichloride-of-mercury solution 1 : 4000 must be poured over the vulva from a pitcher.

FIG. 153.



Tamponing the Uterus with Iodoform Gauze by means of the Intra-uterine Packer.

When repair begins, the uterus being relieved of the septic process, the new leucocytes and plasma-cells are not forced to exercise their phagocytic property by battling with pathogenic germs, but the plasma-cells have a healthy pabulum, and devote their entire energy to the work of regeneration. It is not merely non-suppurating repair; it is histiological growth.

CURETTAGE IN ACUTE PELVIC INFLAMMATIONS.

The question of the propriety of curetting the uterus in the presence of acute tubal and peritoneal manifestations may be dealt with here. If the article on the anatomy of the endometrium be consulted, and one reflects that pelvic peritonitis is very rare in men, he will be forced to believe that the pyogenic germs reach the woman's pelvis through the uterus. That granted, it will become apparent at once that the sequence of pathological changes must be either endometritis, salpingitis, and peritonitis; or endometritis, metritis, pelvic lymphangitis, and peritonitis. The question then is proper: Does this causative endometritis cease the moment the pelvic complication arises? Surely it does not. The peritonitis is not a disease *per se*, but merely an effort on the part of nature to check a disease. One of its first acts is to shut off the tubal inflammation from the peritoneum, by closing with adhesions the fimbriated opening of the Fallopian tube, thus cutting off further extension through that channel. But no such fortunate result can be expected where, as is occasionally the case, the extension is also through the lymphatics. So rapid is absorption in this direction, in some few cases, that the general peritoneum may appear normal, and yet evidences of the infection present themselves on the diaphragmatic peritoneum, as the first point above the pelvic lesion. It is irrational, then, to consider these septic conditions in the light of their results only, ignoring the original source of the trouble, which still remains septic and continues to feed the fire. So long as the infectious focus remains, just so long will the peritoneum throw out lymph. When once the septic focus is removed, the lymph-effusion will cease, and the possibility of further extension from the original source is out of the question. The patient, relieved from the ptomaïne-poisoning, ceases to vomit, the emunctories work properly, and the digestive functions are well performed. From a state of acute poisoning, the case has, by this removal of the causative disease, been converted into one having only the results of the infection, though these are grave. It is eminently proper, therefore, in theory, to curette the uterus before dealing with the sequelæ, in all cases of acute or chronic septic endometritis with salpingitis or peritonitis. In practice this theory has been proven correct and the results positive. Too many successful operations in cases of both septic and gonorrheal origin, have been reported by Pryor and Krug, to admit of question as to the propriety of the method. Since they first drew attention to the subject, it has been adopted by many surgeons as the first operation, indicated in these cases of acute septic endometritis with tubal and peritonitic inflammations, before the complications are dealt with. If, as is at times the case, it be deemed necessary to deal first with the complications, the diseased endometrium should be subsequently treated, if the uterine symptoms persist.

The other methods of treating these cases are by the "expectant" plan of opiates and poultices, or immediate cœliotomy—a procedure extremely irrational in view of what we now know of the pathogeny of pelvic inflammations. In no other part of the body is the unsurgical rule applied, of removing the result of septic infection and ignoring the cause. Still more is the abdominal section contra-indicated, as under these conditions it is made at the worst possible instant. Tubal abscess must ultimately be removed, and adhesions severed. But if the primary cœliotomy be made, it is in a mass of effused lymph, and distended and adherent guts; it leaves behind a septic uterus to generate further mischief.

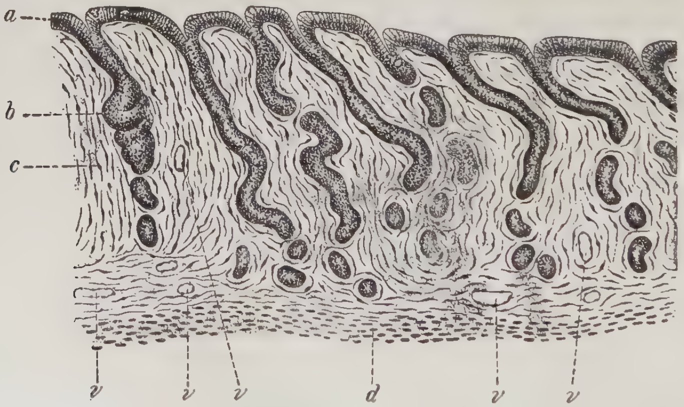
When the curettage is properly performed the improvement in the local condition is marvellous. Irrespective of its effect upon the result and technique of a future cœliotomy, curettage is positively indicated in every case of acute tubal and peritoneal disease, when there is even a suspicion that the infection originated in the endometrium; that is, in the majority of cases. Some of the acute symptoms, as fever, arise not from the pus focus in the tube or ovary, for such is more or less isolated from the general absorptive system, but from the septic endometrium pouring into the lymph-streams an endless supply of septic material. It is not necessary, for the control of these acute symptoms, to evacuate the pelvic abscess per vaginam: they are more immediately subdued by a curettage. Furthermore, if by any possibility there is no tubal disease, the curettage will remove every trace of the infection; in these tender women, positive and precise statements of the pelvic changes are often difficult, and masses of lymph-effusion are frequently interpreted as tubal abscess. The method is no longer new and experimental, but is the one accepted by many American gynecologists. Brought to a case of acute salpingitis and peritonitis, the indications are, not for a brilliant removal of the adnexa, but rather to adopt that method which will preserve the woman from those gross changes in the peritoneum or adnexa, for which so many cœliotomies are done, and to save her, if possible from an abdominal section. So wonderful is the ability of the peritoneum to absorb and repair, that it should in all acute cases be given an opportunity. In the light of its causation, of its pathology, even of its results, acute tubal and peritoneal inflammations of uterine origin, are to be treated by curettage and gauze packing alone as the primary operative procedure. One of three methods must be adopted with these cases: either poultices and hot douches, curettement and treatment of the uterus as any septic cavity, or a primary cœliotomy. The first is the method of the midwife, and merely allows the infection to work its will in the pelvis. The second is surgical in every sense of the word; while to adopt the third in every case, stamps a man as blind to reason and to the work of other men, and as willing to open a fellow-being's abdomen rashly and unnecessarily.

We know that septic endometritis has but a small percentage of mortality, but what frightful ravages it makes in the peritoneum and adnexa! We know that many men apply the curette improperly, and that possibly women are oftentimes worse after it than they would be were they let alone. But should faulty technique and ignorance deter us from laying down the proper treatment? Therefore the rules—and golden ones they are too—may be enunciated: 1, treat all cases of endometritis in the light of its possible results; 2, treat all cases of septic and specific endometritis, with complications, in the light of their causes. If a sloughing polypus causes acute peritonitis, shall it not be first removed? If a sloughing endometrium causes the same complication, shall not the uterus be cleansed?

METHOD OF REPRODUCTION OF THE ENDOMETRIUM.

Repair and reproduction, after removal of the endometrium, is accomplished by means of the lymphoid cells and multiplication of the epithelium and plasma cells. If these are met by pathogenic germs in numbers, their whole effort is concentrated upon the conquest of the germs. Consequently the leucocytes die in large numbers and form pus, while the plasma-cells, deprived of their normal

FIG. 154.



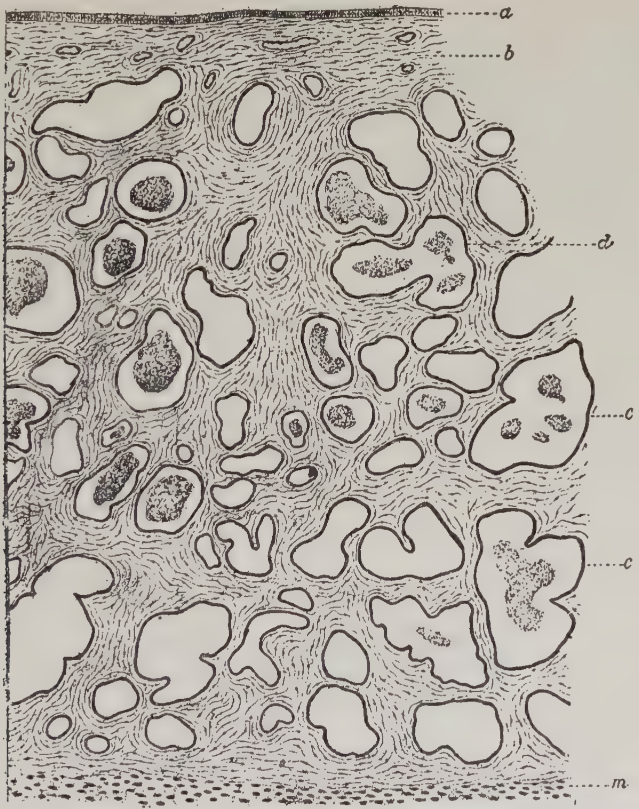
Vertical Section Three Months after Curettement; *a*, *a*, epithelium; *b*, *b*, new-formed glands; *c*, connective tissue; *d*, muscular tissue of the uterine walls; *v*, *v*, blood-vessels.

pabulum (leucocytes), are limited in the differentiated function of gland-formation, and result almost solely in the production of connective tissue.

Hence it is that after an aseptic curettage the endometrium is reproduced in a normal condition in about two months. Conversely, after the membrane has been removed by means which result in suppuration, the endometrium is reproduced but imperfectly.

Fig. 154 is taken from a uterus three months after curettage, and it will be noticed that in almost every particular it is a normal structure. It resembles the endometrium of a young girl soon after the menstrual function has become established.

FIG. 155.



Vertical Section of the Uterine Mucous Membrane Fifty-three Days after the Application of a Caustic: *a, a,* epithelium; *b,* connective tissue; *c, c, c, c,* section of the glands which have undergone cystic degeneration; *d, d,* tubular glands enormously dilated; *m,* muscular tissue of the uterine wall.

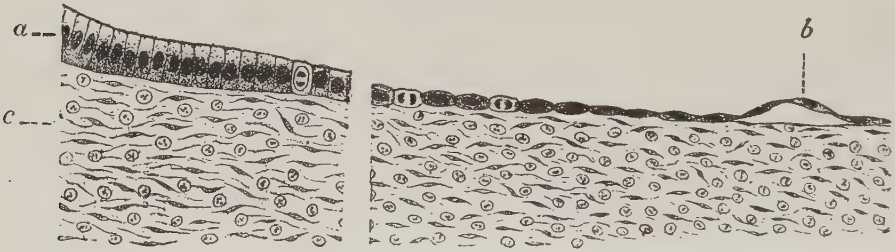
This specimen (Fig. 155) was removed from a woman to whose uterus chloride of zinc had been applied fifty-three days previously.

It will be noticed that the condition here is one of atrophic endometritis of a pronounced degree, with marked interstitial hypertrophy—exactly similar to chronic interstitial endometritis. The gland-follicles are caught in the new connective tissue and form cysts, while the surface of the membrane is covered by epithelium; the glands are scarcely to be found.

These plates prove very conclusively, the facts which have been amply substantiated by clinical experience. It is fair to assume that any caustic agent, which can penetrate as deeply as chloride of zinc, will have the same effects. Such agents are nitric acid, caustic soda, and very strong electrical currents.

The manner in which reproduction of the mucosa ensues is well shown in the accompanying illustrations.

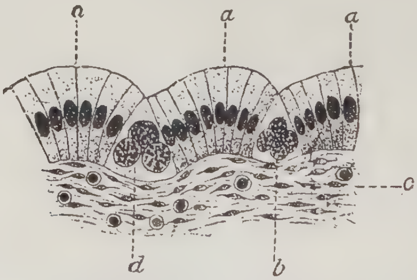
Fig. 156.



Perpendicular Section of the Uterine Mucous Membrane Thirteen Days after Curettement: *a*, *b*, epithelium, newly-formed; *c*, newly-formed connective tissue.

The new flat epithelial cells, developed from the lymphoid cells, gradually change to cuboidal, to cylindrical, and finally to ciliated. The subjacent tissue grows so rapidly and the epithelial cells multiply so fast that the surface of the membrane is thrown into a wavy line, which, as the process continues, takes on the charac-

Fig. 157.



Perpendicular Section of the Uterine Mucous Membrane Thirty-one Days after Curettement: *a*, *a*, *a*, cylindrical epithelium; *b*, *d*, proliferating cells in the deeper part of the epithelium; *c*, new-formed connective tissue.

teristics of a plane surface studded with innumerable crypts. Thus is the new, perfect endometrium evolved from the basement membrane, after curettage.

The AFTER-TREATMENT of cases of curettage for acute tubal or peritoneal disease is as important as the operation. In all cases of curetting after conception, irrigation should be practised on changing the dressing. The details of the treatment are governed entirely by the two great principles: cleanliness and drainage. It would be folly to remove the primary packing from a large uterine cavity and not keep the cervix open; this would merely result in a reinfection, as curettage and irrigation do not remove every particle of sepsis: the cocci are in the lymphatics and often in the venous sinuses. After curettage, the septic uterus must be treated as any other septic granulating cavity, with this distinction: packing should cease when the uterus is reduced in size and its secretions become free from pus-cells. Further treatment may be necessary if the organ remains enlarged. Curettage does not absolutely prevent those symptoms which follow subinvolution, as hemorrhages. Therefore, a curettage done for infection in a puerperal uterus may, later on, have to be repeated for the hypertrophic membrane which gives rise to the bleeding, and which is caused by the enlargement of the uterus. Hence the judicious use of iodine is to be recommended in all cases of enlargement of the uterus. It is wise in cases of retroposition to tampon the vagina with gauze, so applying it that it will act somewhat as a pessary in supporting the fundus. As a final caution the most scrupulous attention to every detail of aseptic work must be employed at each dressing, lest the case be reinfected. This point cannot be too strongly insisted upon. Opium should never be used, as it produces tympanites and vomiting. The bowels should be kept open. After curettage the menses are apt to occur a few days earlier than the usual date. All treatment should be suspended during this period, except where the uterus is septic. Menstruation has no effect upon the routine methods other than to require more frequent changing of the dressings.

Electrical Treatment of Endometritis.

The advocates of electricity in the treatment of endometritis have not, as yet, established any substantial principles, applicable equally well to all parts of the body. They do not tell us the effect of electricity upon the various cocci, or its influence upon the living cell. Does it cause unstriped muscular fibre to contract or to become flaccid? What is its influence upon the white blood-corpuscles and plasma-cells? Take its application in cases of simple endometritis. The application of even slight currents causes the epithelium to exfoliate. The negative pole with from 50 to 70 milliampères for ten minutes, the strength some authorities advise, does more than cause exfoliation of the epithelium —it destroys tissue for a slight distance. In septic endometritis it is said that the current destroys the cocci. Staphylococci will survive being dried upon a cover-glass for ten days, and are then destroyed by exposure, of not less than ten minutes, to boiling water. Will even 100 milliampères do that? But granted that the currents used *will* destroy cocci, what effects have they other than this? A very mild electrical current stops the ameboid movements and checks the processes of cell activity, while it lasts. Currents of moderate intensity destroy the vitality of all protoplasm within reach of the currents. The interpretation of this is very simple. It means that currents much too light to prove germicidal, cause exfoliation of the protecting epithelium, destroy the property of diapedesis of the white blood-corpuscles, and destroy the karyokinetic property of the cells or their ability to multiply. These currents rob the locality to which they are applied of nature's sole defenses against pathogenic germs—epithelium, white blood-corpuscles, multiplication of cells.

By curettage, dead tissue and useless cells are removed. Useful living tissue is not destroyed, but the plasma-cells of the various tissues are given an environment propitious to their development and growth. Can electricity remove the entire septic endometrium in a few minutes, and in a month produce a new healthy one capable of forming a placenta and nourishing a fetus? The methods here laid down can, and have. Conception has taken place five days after a curettage for purulent endometritis.

The great scientific truths upon which, deductively, the method by curettage with its positive results, has been produced, cannot be ignored for another, based upon empiricism, and unsuccessful empiricism at that. The established surgical rules which, the world over, are accepted for inflammations in other parts of the body, are applied to the treatment of endometritis; and until gynecologists who practise the electrical treatment, can lay down for our guidance the positive indications to be filled, and *reasons* for their propositions, indications which are scientific and facts which are not mere personal statements, the use of this measure cannot be recommended. Glittering generalizations will not suffice. What they propose to accomplish within the hidden organs must have been successfully tried on those within view. If fibrous tissue may be removed within, so may it without. If suppuration may be checked within, ample opportunity presents for testing it without. If glandular hypertrophy is corrected in the uterus, so may it be elsewhere. A few years back, when gynecology consisted merely of the dictum of one or two world-famed men, the electrical treatment might have become established. To-day, in the critical light of modern research and the generous distribution of knowledge, it exists, not because of true merit, but through the timidity of suffering womankind, who grasp at the hand offering relief "without an operation."

Inflammation of the Cervix.

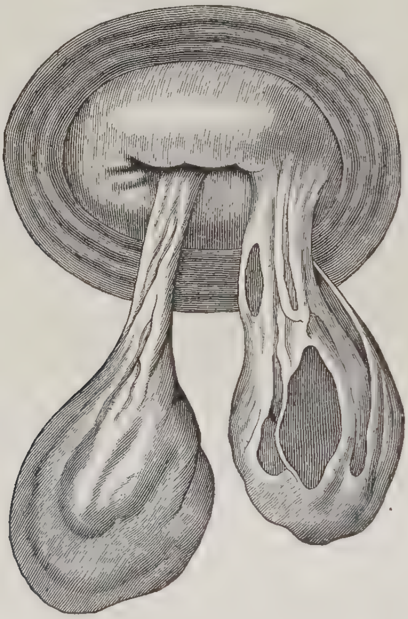
The cervical mucous membrane, because of its anatomical characteristics, is less often the seat of destructive inflammatory changes than the endometrium. Classification of changes in the cervix is usually made according to the clinical appearances. This is too confusing and elaborate. Every case of non-malignant cervical disease may be placed in one of the following classes:

Septic and Gonorrheal Endocervicitis.
Glandular Endocervicitis.
Cervical Hypertrophy.
Cicatricial Stenosis.

Septic and Gonorrheal Endocervicitis.—Acute gonorrheal and septic processes here are not important, except in view of the possibility of extension to the endometrium. The cervical mucous membrane is dense, with few lymphatics, and drainage is so readily obtained, that pelvic lesions from cervicitis are rare if they ever occur. Acute infection of the cervix seldom remains local, but soon becomes general in the uterus. It is as a chronic inflammation that we most often see cervical lesions existing alone. Its compound racemose glands do not readily shed their epithelium, and cocci rest for great lengths of time, attenuated and quiet, in their secretion. This fact being known, we are able to explain the development of latent gonorrheal endometritis and accept the possibility of auto-infection.

Glandular Endocervicitis.—This takes the form of enlargement of certain portions of the normal folds. There is a projection or budding of the membrane, and as this increases the mouths of the glands become obliterated. The imprisoned glands continue to secrete, and the enlargement thus becomes pedunculated, forming a true polypus. Again, the epithelium of the cervix may be exfoliated as the result of a vicious discharge from above: or injuries from below, such as lacerations, may cause the production of granulations and erosions. But, contrary to the general opinion, instead of there being a loss of tissue with this condition, the eroded surface projects beyond the line of healthy membrane. As a result of long-continued irritation to its glands the connective tissue of the cervix may become moderately increased, thereby occluding the glandular canals, and in this way the entire cervix may become riddled with cysts, constituting *cystic degeneration.* Some of these cysts contain clear fluid and some pus. Interstitial hypertrophy of the cervix contributes the essential lesion in one form of anteflexion.

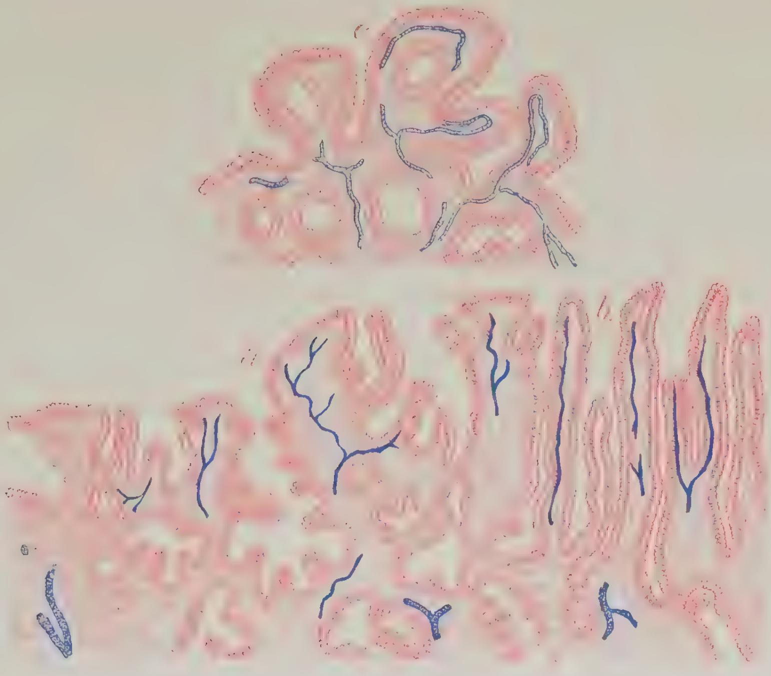
Fig. 158.



Mucous Polypi from the Interior of the Cervix and upon the Surface.

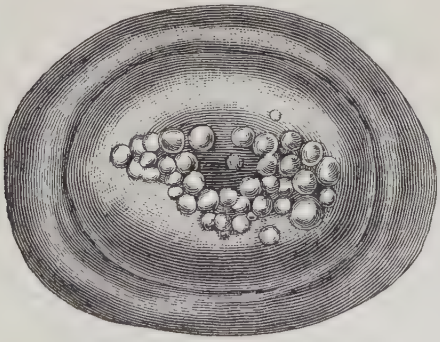
Symptoms.—As all forms of cervicitis entail an enlargement of the cervix, there is the constant symptom of weight and heaviness in the pelvis. Acute septic and gonorrheal cervicitis is usually associated with some other symptoms of these infections, but, if occurring alone, the special symptoms are, that the cervix is engorged, often eroded, and secreting its peculiar mucus, tinged with blood perhaps, but always very purulent. The cervical canal is often gaping. Removal of this mucus is not followed by pus from above, showing the endometrium to be uninvaded. The several cocci are found by the microscope. The symptoms of chill and fever are

FIG. 159.



a, *b*, Simple Papillary Erosion; *c*, Follicular, slightly enlarged.

FIG. 160.



Simple Follicular Cysts of the Cervix.

wanting. Upon the subsidence of the more acute phenomena there will remain but the purulent discharge and some erosion. As has been said, acute septic and gonorrheal cervicitis tends to travel upward, and rarely will a case be seen before it has done so, owing to the absence of general symptoms due to the cervicitis alone. Glandular cervicitis, especially when it has gone on to the formation of polypi, produces a purulent (often profuse) discharge, in addition to the subjective symptoms of bearing-down and weight. The most prominent reflex phenomena accompany cystic degeneration and interstitial cervicitis. Headache is constant and the patient is very nervous. She is very emotional and prone to hysteria, the nervous symptoms being fairly well proportionate to the amount of interstitial change and follicular degeneration. The cysts project from the vaginal aspect of the cervix as rounded nodules, like blisters. If one be pricked, nothing escapes, but gentle pressure forces out a pearl of tenacious mucus. They occur not only on the surface, but in the deeper parts of the cervix also. In glandular cervicitis the canal is usually open, and by separating the lips the enlarged glands may be seen.

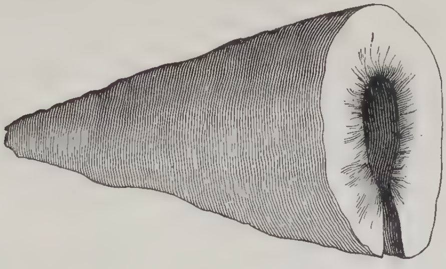
TREATMENT.—Acute gonorrheal and septic endocervicitis are to be most vigorously treated. The plug of mucus must be removed, and the application of powerful antiseptics made, as pure carbolic acid, care being taken not to invade the inside of the uterus. The condition is very hard to check, and is extremely liable to become chronic; but even then there is no better application than carbolic acid. Erosions due to purely local causes, as pessaries, can be readily cured by removing the cause and keeping the parts clean. Erosions are almost always dependent upon some form of glandular inflammation, either in the cervix or above, and are to be relieved by curing that cause. The association between cystic degeneration and beginning epithelioma is very close, while polypoid cervicitis is simple adenoma. Therefore the operative procedures directed to the cure of the latter need not be so radical as for the former. Inasmuch as polypoid cervicitis is seldom general, excision of the polypi is all that is necessary for isolated growths. This can be done under cocaine appplication. Should, however, it be associated with much interstitial hypertrophy, or the polypoid growths be general over the cervix, the excision of a portion from each lip will be of benefit in producing contraction.

A general cystic degeneration is amenable to the wedge-shaped amputation of the cervix, an illustration and description of which will be found in the chapter on Malignancy. It is a good operation, giving most excellent results, and is always to be preferred to Sims's operation, which necessitates a long-continued after-treatment for keeping the cervical canal patent. Many cases also, now subjected to Emmet's operation of trachelorrhaphy, were better operated upon by this method.

Sims's Operation.—This operation, at one time considered the best method by which to amputate the cervix, is now applied to removal of the cancerous cervix only, except by a few of the immediate followers of Dr. Sims. In its performance the cervix is grasped by a stout double tenacula. A blunt bistoury is entered into the cervical canal up to the internal os, and the cervix slit on one side only, to the extreme point of the proposed exsection. Without removing the knife it is carried all around the cervix, returning to the point of starting, thus removing a cone-shaped piece of tissue in the centre of which is the cervical canal.

It will be seen that by this operation a large piece of tissue is removed, and there is no possibility of saving any mucous membrane for the cervical canal. The sutures of silver wire are passed in an antero-posterior direction, and are *entirely* buried. This is an important step, very difficult of execution when the exsection has been carried high up. The entire canal is closed except an opening in the centre for a stem pessary. The sutures are removed on the eighth day. Should the circular artery of the cervix be wounded—and its course is very variable—it is controlled by passing a needle, armed with a silver wire, beneath the vessel, twisting the wire and thus compressing it. This is merely temporary, and should be removed when the final sutures are applied, the latter being sufficient to control all bleeding.

Fig. 161.



Cone of tissue removed by Sims' Amputation of the Cervix Uteri.

Involution is very rapid after this operation, and is apt to be excessive.

There being no canal left in the cervix, a stem pessary must be worn for months, and even years, to keep the new canal, with its cicatricial walls, open. These cases frequently return a few years after operation with the canal almost closed, and require incision and dilatation, for a long time. This is the great drawback to the operation, and one which precludes its use. The cone of tissue in the illustration is longer than it is usually necessary to remove.

Cervical Hypertrophy.—Cervical hypertrophy may be so great as to simulate prolapsus, and, indeed, it may produce a certain amount of descent, but the fundus is always found higher than in prolapsus. The total length of the uterine canal is greater, the increase being chiefly in the cervix; there is no rectocele, but a spurious cystocele accompanies the condition, as the urethra and base of the bladder follow the increased growth of the cervix. Still, the caution is necessary, that in amputating these hypertrophied cervices great care be exercised lest the bladder be opened, as the hypertrophy may spring from near the os internum, in which case the vesical organ will be dragged down with it. The sound in the bladder, however, will show the relations of that organ to the hypertrophy. The cervix may be so generally inflamed and, at the same time dilated, that the membrane will be rolled out, forming a true ectropion, and presenting the evidences of glandular hypertrophy, even amounting to glandular polypi. Excision is here necessary by the method already indicated.

Cicatricial Stenosis.—As a result of operations—especially of Sims's operation of exsection—inflammations, and application of caustics—rarely as a congenital lesion—we may have a cervical canal so contracted as to form a true stenosis, or an atresia; the condition may even give rise to hematometra, and require treatment as for congenital atresia. It is amenable to the operation of bilateral incision. The after-treatment is long and tedious, and the patients are forced to remain under observation for a great length of time. This is necessary because the operation is usually done in a field of cicatrical tissue, which tissue possesses an inherent tendency to contract, repeated or continuous dilatation being necessary for its prevention.

The exception to this treatment is where the stenosis is due to inflammatory changes. Here the bilateral incision is to be followed by gauze packing for three weeks, the packing being limited to the cervix alone.

These shallow incisions, followed by dilatation, are covered over by a modified form of mucous membrane in a remarkably short time. Stem pessaries are not necessary, unless the tissue be newly-formed cicatricial tissue; in other cases the cervix will remain dilated around even a very fine filament of gauze, and while the latter is in place the formation of the new membrane goes on speedily.

In considering all these questions involved in the treatment of diseases of the uterus it must not be forgotten that the organ is embryonic and capable of reproducing its tissues to a certain extent, but reproduction does not take place from scar-tissue or in the presence of suppuration.

Metritis.

This condition is of very minor importance, because it is merely a name for certain changes in the muscular walls, secondary to more important conditions. An idiopathic metritis does not exist: it is always secondary to, and an extension of, the inflammation of the endometrium. Inflammation of the muscularis uteri follows all acute and many chronic infections of the mucosa. The treatment of the two conditions is identical, and has already been fully considered under Endometritis. A low form of tissue change also accompanies the various neoplasms, flexions, and versions. These will be described in the proper places.

Subinvolution.

The condition known as subinvolution which follows labor is not, *per se*, a disease, but merely an association of conditions resulting from a common cause. The uterus has not yet fully undergone those retrograde changes which normally follow labor. It is enlarged in all its diameters and the mucosa is thickened. The organ being heavy and its walls softened, it shows a tendency to sink low in the pelvis or take a retroposition.

The intimate histological condition is one merely of fatty, enlarged, unstriped muscular fibres, enlarged vessels and lymph-spaces, and glandular hypertrophy of the mucosa. It can scarcely be termed strictly a pathological condition, rather is it an incomplete physiological one. When it has persisted for some time, fibrous tissue hyperplasia does take place in the muscular walls, and the change in the mucosa becomes a permanent hypertrophy.

Symptoms.—If the menses have returned, they are increased in amount, but are not painful. If the engorged organ is low down, retroverted or retroflexed, the symptoms present are of constant and severe backache, together with bearing-down pains.

There may or may not be a complicating endometritis with pathological discharges or leucorrhea; most generally the cause of the interruption of the normal involution is a septic or specific endometritis. Under these circumstances all the symptoms of endometritis are present.

Usually all patients complain of a sense of weight and heaviness in the pelvis. There are present the general symptoms of anorexia, costiveness, anemia, and general malaise. Women with subinvolution are very subject to melancholia, which may even amount to a temporary insanity, not acute. Mania following labor and due to infection by streptococci is not to be confounded with this mild aberration of intellect. This condition is not a frequent one, and, when found, is generally in stout, plethoric women.

Examination shows the enlarged, soft uterus, possibly low down or retroposed. It is not tender in uncomplicated cases, but is extremely so in the presence of an accompanying endometritis.

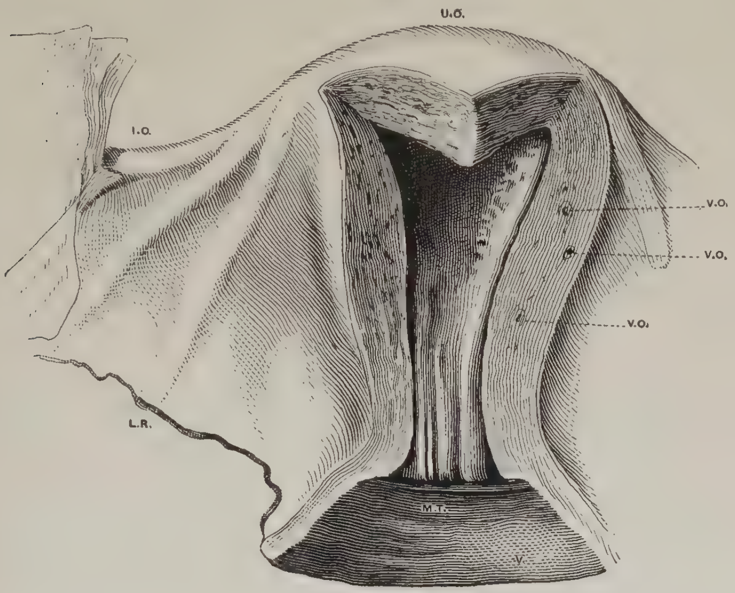
Treatment.—The general conditions predisposing to this malady must be met; therefore strychnia and cinchona before meals, and wine and iron, are indicated. The combination of ergotin and quinia is exceedingly efficacious.

Locally, intra-uterine applications of tincture of iodine, with the supporting and depleting tampon of ichthyol 5 or 10 per cent. in 50 per cent. boroglyceride, twice a week, are all the requisites for effecting a cure, in the absence of any acute symptoms. Hot vaginal douching should be employed twice each day between treatments. If the hemorrhages are of serious moment, curettage not only removes that factor, but materially hastens the involution. General treatment is of great importance.

If subinvolution be neglected, the organ is prone to take on almost any form of inflammatory change, and is especially liable to septic infection. The condition materially reduces the organ's resistant power against pathogenic germs. Many cases of grave pelvic lesions and uterine displacements may be traced to neglect in guarding against this condition after confinement or abortion.

Subinvolution is very frequently caused by a septic or specific infection of the uterine cavity in the puerperal woman, resulting in an endometritis. Such cases resolve themselves eventually into a true condition of metritis and endometritis, and are to be dealt with as such.

Fig. 162.



Subinvolution.

Hyperinvolution.

The condition known as hyper- or super-involution follows labor, and is due to causes unknown. The natural involution of the uterus following labor reduces the size of the organ slightly below its normal condition, but subsequently, within the course of a few weeks, this loss is regained. Occasionally involution does not cease at this point, but continues beyond the physiological condition, until the womb becomes, at times, even as small as an inch or an inch and a half in depth. The causes which change the physiological process into a pathological one are obscure, and can rarely be detected. Fortunately, the occurrence is rare, as the condition is extremely difficult to treat successfully, most commonly baffling all the efforts of the physician.

Painful and scanty menstruation are common attendants, and are, in fact, the principal symptoms. The dysmenorrhea is of a severe and persistent type, usually appearing prior to the flow and lasting throughout its whole course, and is undoubtedly due to the atrophic condition of the endometrium. The ovaries may or may not be involved in the process: should they become involved, it would be one more causative factor added to the dysmenorrhea, and would exaggerate that condition.

The physical examination, together with the history, renders the diagnosis clear. The uterus is found small and its walls of firm consistency, at times almost fibroidal in character. The depth of the uterine cavity is reduced from two and a half inches, the normal, to one or one and a half inches.

The medical treatment of the disease is not productive of any assured success. It consists in rendering the patient's general health as nearly normal as possible, at the same time stimulating the uterine muscle. Probably electricity, both general and intra-uterine, gives as much promise of success as anything. Should the physician's efforts be attended with good results in accomplishing a return of the uterus to its normal size, the menstrual flow will become more natural in quantity and the dysmenorrhea will gradually disappear. Most often the treatment consists in simply controlling the pain. Efforts in this direction will be accomplished by much the same means as given in the chapter on Dysmenorrhea. As a rule, the patients will have to be content to bear their sufferings as best they may, with what amelioration drugs will give, until the change of life ends their period of probation. Should the pain become so great as to render life miserable, a resort may be had to ovariotomy with the view of bringing on an immediate menopause. The justification of this procedure must rest entirely with the individual case, the event being determined by the amount of suffering and the failure either to cure the condition or to relieve the symptoms. It is far better to perform the operation of removal of the ovaries than to have continuous resort to opium, with all its attending dangers. The question of childbearing need hardly be considered, if for no other reason than that these women are rendered sterile by their condition. Pregnancy, if it could be brought about, would probably produce a cure, or rather it might be nearer the truth to say that this condition would be proof that a cure had been accomplished, as pregnancy is most improbable until there is a return to the normal condition of the endometrium.

LACERATIONS OF THE SOFT PARTS.

Laceration of the Cervix Uteri.

Laceration of the cervix is one of the commonest of all gynecological affections, and is the consequence of an attempted dilatation, whether by the head of the child in labor or by the uterine dilator in the hands of the gynecologist.

The tear occurs in consequence of the refusal of the external os uteri to dilate sufficiently to allow the head of the child to pass, the result being that there is a rupture, usually on both sides, which extends a variable distance up into the uterus and into the vault of the vagina, along the base of the broad ligaments.

These ruptures are with remarkable uniformity bilateral; occasionally unilateral or stellate.

Deep fissures, unaccompanied by lateral tears, occupying the median line in front and behind, are almost without exception susceptible of some other explanation. Posteriorly, for example, many cases observed are cases in which the operation of discission or splitting of the cervix for the relief of dysmenorrhea, had been practised. Anteriorly, a median split is often significant of the surgeon's knife or scissors, used to incise the rigid os, or more often it arises from the use of the obstetric forceps.

The immediate danger arising from these tears is the ready access afforded for the invasion of the pelvic connective tissue by septic germs. This is to be prevented by unusual care, during the confinement and puerperium, in avoiding sepsis by cleansing out the vagina before labor where there is any purulent discharge, and by maintaining an aseptic condition during the confinement.

If it is necessary to handle the cervix, this should be done with a sterilized rubber stall drawn over the finger. After the confinement, douches should not be given as a prophylactic, but become necessary when the existence of an infection has declared itself.

It is not proper, in view of our light and methods of to-day, to attempt the immediate repair of cervical tears. Where, however, there is a constant flow of arterial blood, trickling in a small stream from between the labia, and digital examination reveals the presence of cervical laceration, it will be found that the hemorrhage proceeds from the rupture of a cervical artery. In such a case an immediate operation must be undertaken. The patient should be brought to the edge of the bed, with the thighs flexed upon the abdomen—the dorsal position—and the posterior vaginal wall retracted with the aid of a Sims speculum. The blue, soft lips of the cervix, appear low down in the vagina; they should be grasped by a pair of bullet forceps, drawn down to one side, and the tear from which the bleeding comes exposed. The operator then passes a needle deeply through the tissue, in such a way as to include the vessel and serve at the same time to approximate the torn lips. Two or three similar sutures below this uppermost one, each tied in the vagina, will serve to secure an accurate approximation of the lips throughout. The sutures must not be tied tightly, and no dressing should be applied in the vagina. Such an operation will be almost invariably successful. The sutures may be left in place for six or eight weeks if necessary.

Where it is unnecessary, for the purpose of controlling hemorrhage, and it is necessary only very rarely, to make an immediate repair, the patient is to be treated on the expectant plan. If no sepsis occur, to disorder the vaginal and uterine discharges, a spontaneous closure of the laceration will take place. For the accomplishment of this only ordinary care in the line of cleanliness is necessary. The majority of cervical lacerations are cured by nature.

Some months or some years after a confinement one of three appearances will be observed in cases of laceration of the cervix: Firstly, the cervix presents a normal appearance with a slight or a marked notch on either side; secondly, the cervix presents two well-defined lips, and is even torn down to the vaginal vault: the lips are soft, flaccid, and not thickened; thirdly, the tear is not so

Fig. 163.

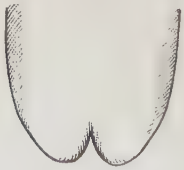
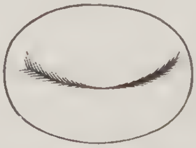


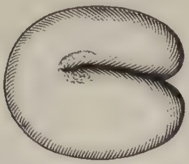
Fig. 164.



Side and Front Views of a Simple Bilateral Laceration, requiring no treatment.

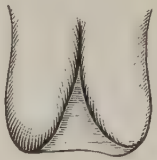
evident on inspection as in the last variety, but the cervix appears thickened, and hardened, its angry red centre presents the appearance of an erosion, and distended glands are more or less abundant. Out of the cervical canal exudes a glairy or muco-purulent secretion, which continually irritates the ulcerated part and prevents it from healing; in fact it has in the beginning been the origin of the ulceration. On catching the anterior and posterior margins of the cervical lips in two tenacula and attempting to draw

FIG. 165.



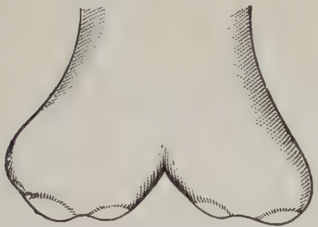
Front View of a Unilateral Laceration requiring no treatment.

FIG. 166.



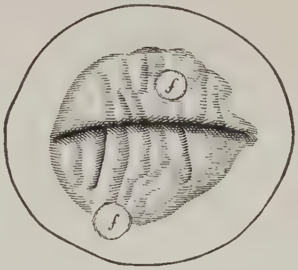
Side View of a Unilateral Laceration; such a laceration may cause abortion in the latter months of pregnancy.

FIG. 167.



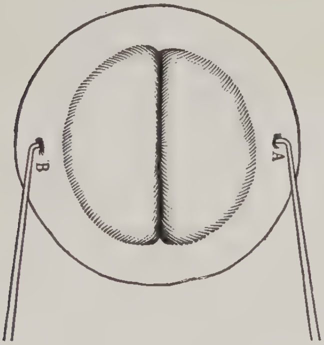
Side view of a Bilateral Laceration, requiring treatment. The lips are everted, and the Nabothian follicles stand out as prominent papillæ.

FIG. 168.



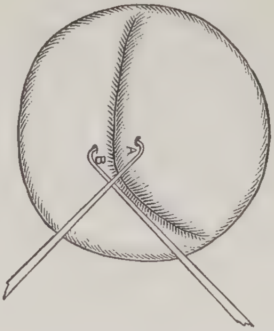
Front View of a Bilateral Laceration, showing eroded area and Nabothian follicles.

FIG. 169.



Tenacula in place, showing eversion of lacerated cervix.

FIG. 170.



Tenacula crossed, showing the method of approximating the lacerated lips, demonstrating the true condition.

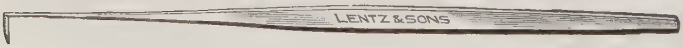
them together, it is at once evident that there is a laceration with well-defined lips, which are deeply infiltrated. As the lips are drawn together the erosion in the centre is turned in and disappears, showing that it is a part of the mucous membrane of the cervical canal. In other words, the condition is that of a lacerated cervix with everted and eroded lips, that condition so frequently mistaken in the past for ulceration of the cervix. This third class of cases is the only one demanding treatment.

It is an undoubted fact that the majority of cases of cancer of the cervix occur in women who have borne children and have a lacerated cervix. It is also undoubtedly true that cancer of the neck of the womb not infrequently occurs in nulliparous women. The only reason for the surgical treatment of the first two classes would be the fear that any ulceration of however small degree would have a determining influence on the development of cancer. This fear is, however, not so well supported by facts, as is generally supposed.

Laceration of the cervix is frequently associated with subinvolution of the uterus and pelvic venous stasis. Leucorrhea, dysmenorrhea, aches and pains, a feeling of weight and bearing down or dragging referable to the pelvis, associated with a feeling of general weariness are the symptoms generally found in this condition.

The best method of relieving these associated troubles is by repairing the cervix, in order to start involution of the uterus, which process commonly follows operative procedures on that organ. The steps of the treatment consist in the proper denudation of the lips and approximation of the denuded surfaces by sutures. Where infiltration is very marked the lips cannot accurately be brought together, and therefore preparatory treatment is required.

Fig. 171.

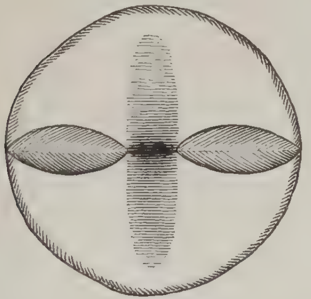


Knife-bladed Tenaculum, used in scarifying Cervix.

Preparatory Treatment.—This consists in measures calculated to deplete and diminish the size of the cervix. Douches of water, as hot as can be comfortably borne (110° F.), once or twice daily for from ten to twenty minutes, followed by a rest for an hour, are valuable adjuvants. The cervix must be exposed by the use of a Sims speculum, with the patient in the dorsal position. Depletion is then obtained with a fine knife, by opening as many distended follicles as can be seen. From four to eight drachms of blood should be drawn once or twice a week. By following each depletion with a pack of boro-glyceride on cotton, 50 per cent., left in for twenty-four hours, the cervix in from three to six weeks will be reduced in size and quite flaccid, and in a favorable condition for the plastic operation.

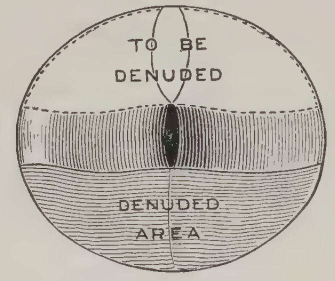
Operation.—As a preliminary step it is absolutely necessary to make sure by a bimanual examination that there is no inflammatory disease of the pelvis involving the ovaries and Fallopian tubes. The patient is then placed in the dorsal position, with the buttocks on the perineal pad and the thighs held well flexed on the abdomen by the leg-holder. The cervix is exposed by retracting the posterior vaginal wall with a Sims speculum, and the anterior and posterior lips are caught by bullet forceps and drawn down to the vaginal orifice. A constant irrigation of the field of operation is kept up throughout the whole procedure. Drawing the cervix a little to one side, an incision is made in the angles of the tear as deep as the denudation on the lips is to be carried. Scar-tissue is often encountered in the angles, and the incision must extend below this, into healthy tissue.

Fig. 172.



Incision in the Angles of the Laceration.

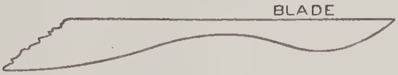
Fig. 173.



Method of Denudation.

From this incision the denudation is carried down, first on the posterior, then on the anterior lips, as shown in the diagram, by means of a sharp knife. Care must be exercised not to denude too much on the vaginal surface, and, on the other hand, to leave a

Fig. 174.



Blade of Knife used in the Denudation.

small strip of undenuded mucosa in the centre on both lips, which will represent the future cervical canal. Both lips are similarly denuded.

An effort is made in the denudation to go through cicatricial into the sound tissue everywhere, and to make such denudations as will, when approximated, secure a conical cervix projecting into the vault of the vagina, with a small external os.

No fear need be entertained of wounding the circular artery. Any vessel which is divided during the operation will be controlled as soon as the sutures are introduced.

The sutures are of silkworm-gut and fine silk; the former at points of greatest tension, and the latter when necessary to secure accurate superficial union between the tense deep sutures.

A small stout curved needle with its carrier is grasped in the needle-holder and a strand of silkworm-gut hooked into the loop. The operator, while the lips are drawn well apart by his assistants, introduces the needle just above the angle of the incision, on the vaginal mucosa, and with a sweep brings it out in the cervical canal high up. It then crosses the canal to a corresponding point, re-enters the tissue, and reappears on the vaginal mucosa of the opposite lip, at a point opposite and corresponding to the point of entrance. A second suture is passed, in like manner, a little lower down on the lips, and often a third near the point. These sutures are left loose and clamped in a pair of artery forceps, while the sutures of the opposite side are introduced in like manner.

Fig. 175.

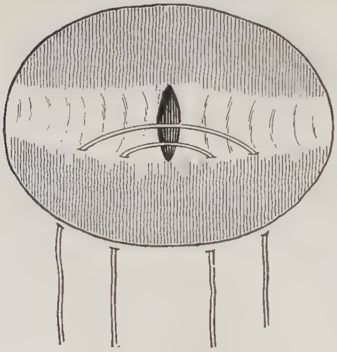
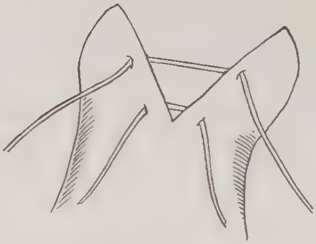


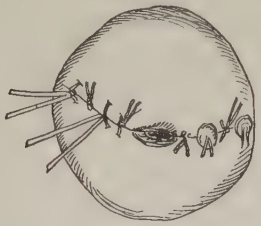
Fig. 176.



Silkworm-gut Sutures in place on one side, ready to be tied; front and lateral views.

There are two ways of securing sutures so as to hold the lips snugly together: they may be simply tied in a square knot, or they may be held fast in place by running a perforated lead shot down, and pushing it up on the suture until the lips are drawn closely together, when the shot is squeezed and allowed to remain in place. When the vaginal outlet is operated upon at the same sitting, it will be easier to remove the cervical stitches if the shot is used. It is not necessary to observe such great care in removing all blood-clots from the angle of the wound before approximating, as has been generally supposed.

FIG. 177.



Silkworm-gut Sutures in Place, tied on the right and shotted on the left side; intervening Approximation Sutures of fine silk.

The uppermost sutures are tied first, and then in succession the other ones. Any pouting between the sutures should be disposed of by introducing superficial sutures of fine silk between those of the silkworm-gut.

The vagina is washed out after the operation, and a loose iodoform gauze pack applied, which is left in place five or six days. The vulva is protected with sterilized cotton and a T-bandage.

It is not necessary for the success of the operation, as far as securing good union is concerned, that the patient should remain in bed; it is, however, important in a certain class of run-down patients, for the sake of their general good condition and to make an impression on their nervous system, that they be kept in a recumbent position for two or three weeks. This combination of the rest cure with the operation is so important that it may well be doubted in many cases if the rest has not been the most important, if not the sole factor in the recovery.

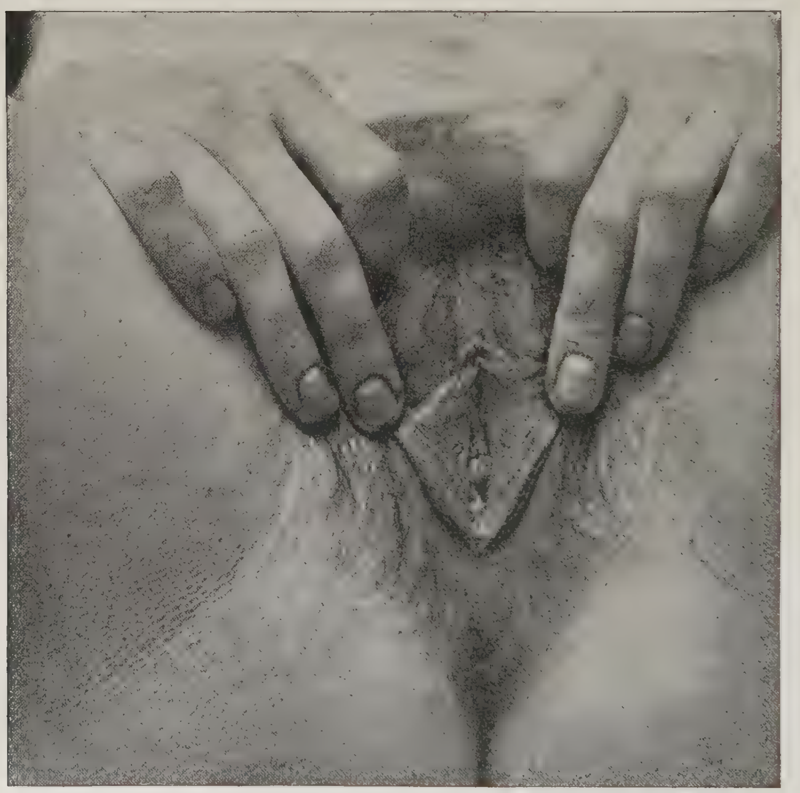
Catheterization need only be practised so long as the patient is unable to void urine. The bowels should be opened at least every other day, occasionally by mild purgative medicines, preferably by enemata of soap and water, or oil and water.

The stitches should be removed in from three to six weeks; when the vaginal outlet has been operated upon, they should be allowed to remain two or three months undisturbed, to avoid dilating the outlet in their removal. They are best removed by placing the patient in the side position and retracting the posterior vaginal wall until one of the sutures is seen; this is caught by a pair of forceps and drawn down until its loop is exposed, when it is cut and the suture drawn out. It is important after all have been removed to make a digital examination in order to verify the fact. Sexual relations should be forbidden for three months.

INCOMPLETE RUPTURE OF THE RECTO-VAGINAL SEPTUM.

Recent.—Recent incomplete ruptures of the recto-vaginal septum appear as furrows in one or both vaginal sulci, extending down to the posterior commissure and outward, involving the skin perineum as far back as, but not including, the sphincter ani. These furrows are made by the child's head or shoulders in passing through an outlet either relatively too small or through one whose tissues are

FIG. 178.



Virginal Vaginal outlet.

not sufficiently elastic, or, again, in entering the outlet in a faulty position, as in occipito-posterior positions. The forceps are a frequent factor in the production of these injuries. Shallow tears of this character may be neglected, and if the parts are not infected during the puerperium their natural apposition will generally be sufficient to ensure a partial primary union, provided injections have not been given during the convalescence and union prevented by the nozzle of the syringe entering into and separating the lips of the wound. Hemorrhages following these lacerations are not often serious, but are at times exceedingly annoying.

Tears extending half an inch down into the tissue should be repaired at once; that is, within the first twenty-four hours. It is a common but serious error to estimate the amount of injury by a superficial examination of the external parts. This is insufficient, as the worst part of the tear lies concealed within the vagina and can only be disclosed under a good light and by separating the labia and walls of the lax vagina by two fingers.

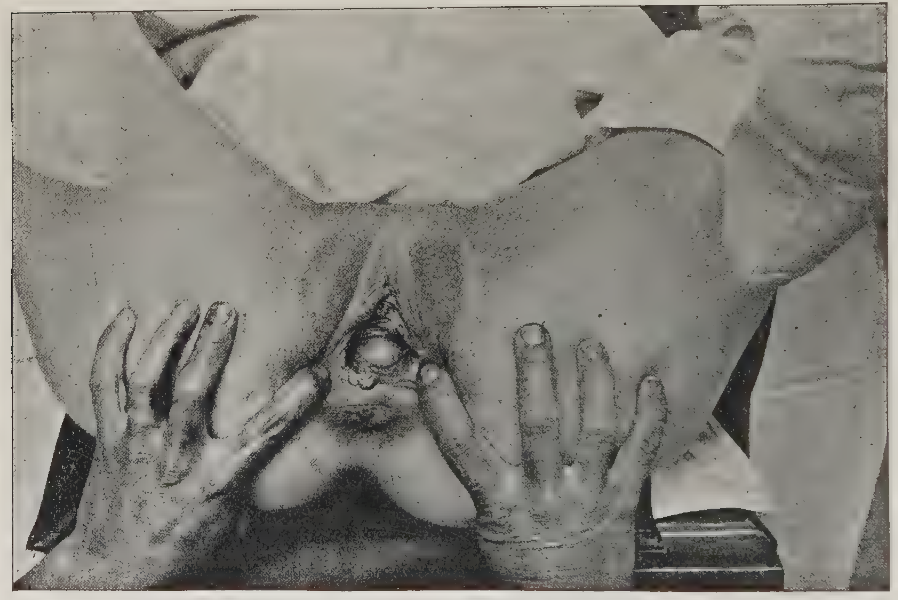
The process of suturing is simple, and is like that described in the operation for complete tear after the closure of the rectal laceration. As the natural tendency of the tissues is to lie in apposition, but few sutures are necessary to assist nature in the repair. It is well during their introduction to control the uterine discharges by a tampon of iodoform gauze, placed loosely against the cervix. Two or three silkworm-gut sutures are sufficient to close a long vaginal rent. The first one should be introduced at the upper angle of the tear and passed well down to the bottom of the sulcus. On the skin surface two or three superficial or half-deep silk sutures will complete the approximation. A dry powder of boric acid or boric acid and iodoform (7 : 1), and a loose vulval pad of absorbent cotton, complete the dressing, which should be renewed frequently for the first few days. In eight or ten days all sutures may be removed, and, in the absence of sepsis, the union will be perfect, if the sutures have been well applied.

Old Incomplete Tear.

Relaxation of the Vaginal Outlet.—If a recent incomplete tear is neglected, there may be one of several results: a complete union, which is unfortunately rare, may occur throughout without interference. A partial union may take place at the bottom of the tear while the upper part granulates and cicatrizes: the cicatricial contraction in such a union may be sufficient to compensate for the deficiency created by the tear. Finally, the result of such an injury is a permanent deficiency at the introitus, resulting in a relaxed outlet, from which the vaginal walls become more and more everted, forming cystocele and rectocele in the erect position, and from straining efforts, until finally in some cases the bladder, cervix, and uterus escape, a prolapse following as the result of the relaxation.

A relaxed vaginal outlet is recognized by the flatness of the crease between the buttocks in front of the anus. Often, a series of concentric wrinkles surround the entrance of the vagina, which is dropped back nearer the anus. The commissure of the labia may be entirely uninjured, or it may be torn down to the sphincter, and replaced by a pit of scar-tissue. This latter fact in no way influences the condition.

Fig. 179.

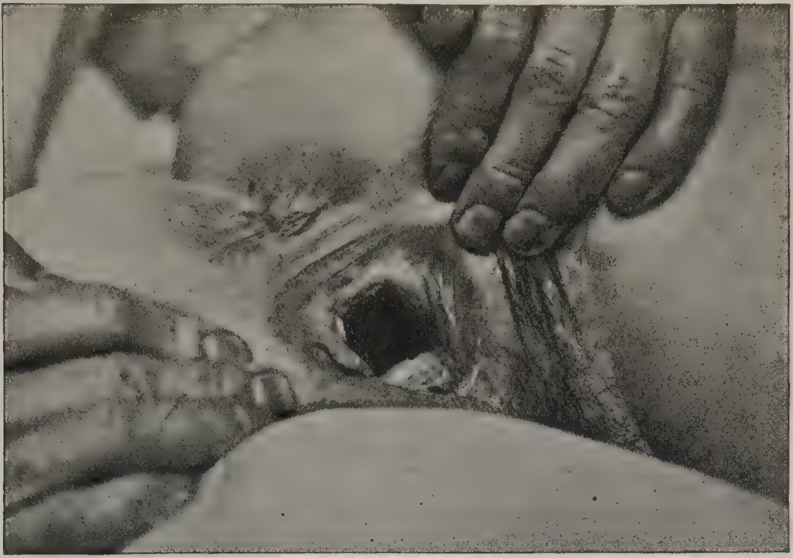


Relaxed Vaginal outlet as seen in the dorsal position.

On separating the labia on either side with the thumbs, the outlet presents an everted, gaping appearance, and on testing it with the fingers, its structures are found lax and incapable of resistance. The cervix is readily exposed by making a speculum of the fingers to push back the anterior and posterior vaginal walls, and the uterus is quite often found retroposed and in descensus.

The direction of the outlet in cases of relaxation is characteristic. Normally, it points downward and backward toward the end of the sacrum, while here its direction is toward the promontory or into the abdomen.

FIG. 180.

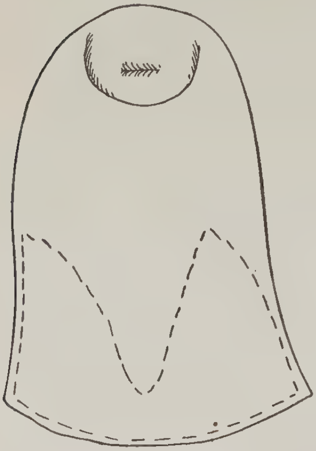


Appearance of Relaxed Vaginal Outlet in Sims's Position.

The symptoms occasioned are numerous and in direct relation to the lesion. There is a feeling of pressure, of dropping out, of something protruding, and of discomfort on walking, the patient preferring the sofa; there is backache, and a dragging sensation, due to the increasing displacement of the uterus. Leucorrhea and all the symptoms of endometritis are apt to supervene. The bowels are constipated, as the expulsive efforts are wasted on the outlet, the sphincter ani muscle forming the greatest point of resistance. Nervous symptoms, referred to the stomach and head, are but expressions of the general loss of tone.

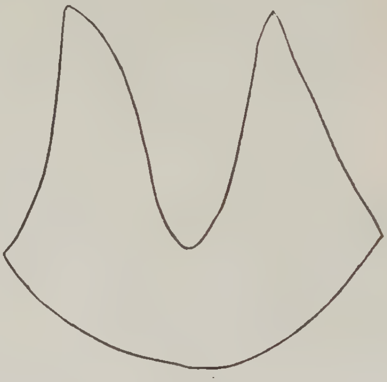
The treatment of this condition is by a resection of the outlet and both sulci in a similar manner to the Emmet operation. The denudation includes the posterior two-thirds of the outlet and extends up each sulcus in the form of a triangle. It is unnecessary to extend this denudation on the outside, beyond the ring of the hymen or its broken remains, but it should be carried not less than an inch or an inch and a quarter up each sulcus. It is best to outline the area to be denuded with the point of a knife. Two points in the hymeneal ring are caught with curved tenacula on either side, between a half and three-quarters of an inch from the urethra, these points being represented by the lower caruncles or remnants of the hymen. These points when drawn together will show the size of the repaired outlet, due allowance being made for future relaxation. The points, being widely separated, are now connected by two lines, made with the knife, the first U-shaped, from one tenaculum, down, around the posterior commissure of the labia, to the tenaculum on the opposite side. The second is an inverted M lying entirely within the vagina, its middle point (1) being from three-quarters of an inch to an inch above the centre of the U, directly on the crest of the rectocele. The side lines (2) (2) of the $\underset{2\ 2}{M}$ lie on the lateral walls, parallel to and just below the anterior wall. The denudation is now rapidly made by catching up the tissues with

Fig. 181.



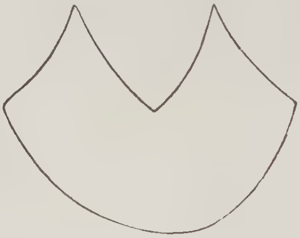
Looking down on the Floor of the Pelvis. Dotted lines indicate the area to be denuded.

Fig. 182,



Area to be Denuded within the Vagina, outlined with point of knife.

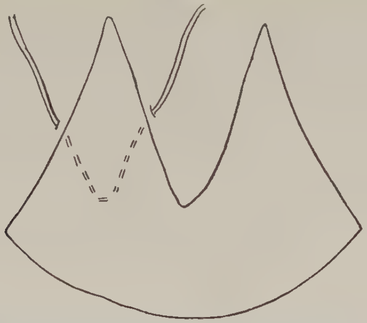
Fig. 183.



Area on Skin Surface to be denuded, outlined with point of knife.

dissecting forceps within the limits of the marking, and cutting off the tissue in long strips with scissors curved on the flat. Bleeding vessels rarely require tying, as the sutures, introduced immediately after the denudation, control all hemorrhage.

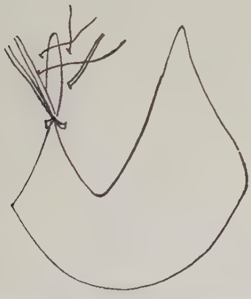
FIG. 184.



Drawing or Tension Suture, introduced and ready to be tied.

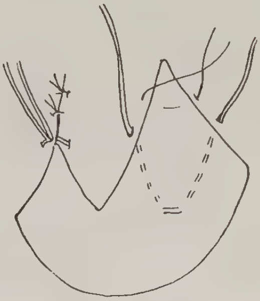
Sutures are now introduced to bring the sulci together, and the first suture of silkworm-gut is placed about halfway down the right sulcus, entering and emerging on the vaginal mucosa close to the incision. At the bottom of the sulcus the suture appears at a point lower down toward the outside than either the point of entrance or emergence. This suture is tied at once, and lifts up the lower part of the denudation, and also serves as a tractor, in bringing down the denuded area above, thus facilitating the introduction of the remaining sutures.

FIG. 185.



Drawing Suture tied, and Superficial Silk Sutures in place.

FIG. 186.

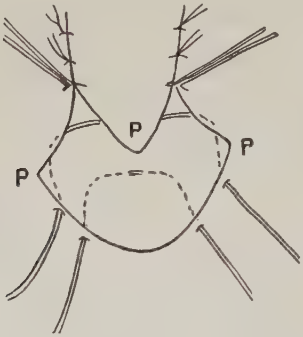


Sutures tied on Right, and in place ready to be tied on Left side.

The silkworm-gut suture is tied, and the approximation above is made perfect by three or four silk sutures, each of which must sweep well under the tissue, the last one being introduced at the angle to prevent hemorrhage from the vessels cut during the denudation. On the opposite side silkworm-gut and silk sutures are placed in a similar manner.

The wound-area is now reduced to a shallow pit, representing the lower end of the denudation in the sulci, on each side of the central undenuded tit, and the more external part of the denudation already somewhat reduced in size.

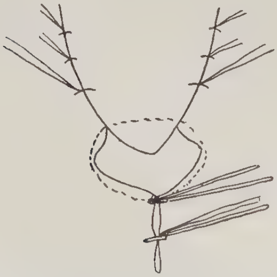
FIG. 187.



Sutures of Both Sides tied, and the Crown Sutures in place.

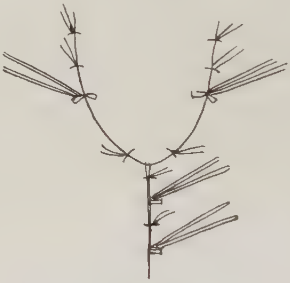
One or two gathering sutures now almost completely close this whole area. A silkworm-gut suture is introduced well below, transfixing the three points *P*, *P*, *P* (Fig. 187). By drawing these points together the wound is contracted to a superficial area, which can be readily approximated by a few superficial silk sutures.

FIG. 188.



All Sutures tied, leaving a superficial area to be closed with fine Silk Sutures.

FIG. 189.

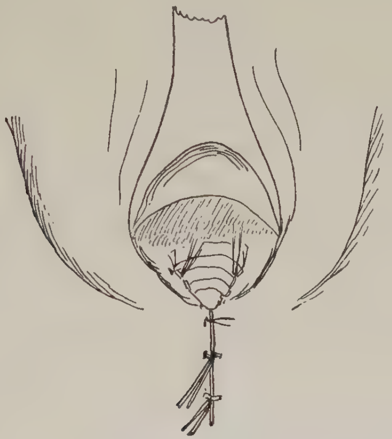


Completed Operation.

LACERATION OF THE PERINEUM.

Rupture of the Recto-vaginal Septum—In complete rupture of the perineum the septum between the genital and the alimentary canals is broken down for a variable distance, and both possess a common outlet. The tear extends from the posterior commissure of the labia back through the perineum and the sphincter muscle into the rectum and for a variable distance up the rectum and vagina. This injury may vary from a superficial tear, barely involving the sphincter muscle, to a rupture extending one or more inches up the septum toward the cervix. The cause of this injury is parturition-dystochia at the vaginal outlet.

Fig. 190.



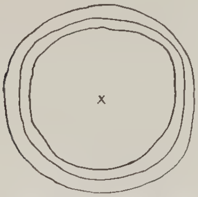
Speculum introduced into the Vagina, showing the result of the operation.

One of the commonest causes of rupture of the recto-vaginal septum is rapid delivery of the child's head with forceps, thus bringing the head down upon an insufficiently relaxed outlet, and substituting a hasty delivery, accomplished during a few pains, for nature's slow equable dilatation attained after a great number of descents of the head, each time wedging the orifice a little farther open. The rupture in these cases begins at or within the posterior commissure, and extends rapidly back over the skin, perineum, and through the sphincter into the anus and up the septum. A head, unusually large, or one which has not been susceptible to moulding, or one persisting in the occipito-posterior position, are all frequent occasions of this injury.

The immediate dangers from sepsis are great in these cases, as in all difficult labors involving delay, because of extensive injury to the soft parts, more or less prolonged manipulation, and especially the subsequent constant contamination of the lacerated area by fecal discharges.

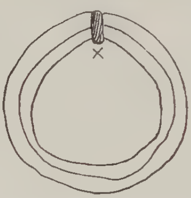
Symptoms.—The common symptom is incontinence of fecal discharges and flatus. Where the rupture has merely extended through the sphincter or but a short distance beyond, it is possible for the subsequent contraction of the scar-tissue, forming between the two ends, to so bind them together and give the sphincter muscle a *point d'appui*, that it will remain functionally active and no feces will escape, and sometimes the patient will control even the flatus. It is important to recognize this fact, as writers have positively asserted that with every tear of the sphincter its function is necessarily abrogated. We must be prepared, therefore, to meet lacerations of all degrees—shallow tears in which the sphincter's function is not apparently interfered with, those which are deeper, but in which some control of feces is still retained, and still others in which there is a complete tear resulting in absolute incontinence, the flatus escaping and the patient soiling herself as soon as the desire for evacuation is felt.

Fig. 191.



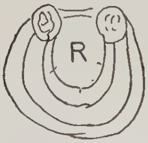
Normal Sphincter; no break in the continuity of the circular fibres.

Fig. 192.



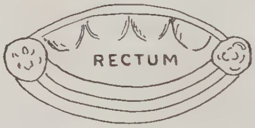
Slight Solution of Continuity in the Sphincter filled in with connective tissue. No impairment of function.

Fig. 193.



Solution of Continuity imperfectly bridged over with connective tissue. Partial loss of function.

Fig. 194.



Sphincter completely Ruptured. Divided, ends being widely separated. Complete loss of function.

Treatment.—The only successful plan of treatment is reunion of the torn surfaces by suture. Such an expectant plan as binding the knees together and restraining the patient's movements after confinement, is to be rejected as worthless. In all these cases the immediate operation is called for within twenty-four hours after the labor. If performed aseptically, this operation will invariably be successful.

The Immediate Operation.—If the patient has been greatly exhausted by the confinement, or if the physician is not prepared to perform the operation properly at that time, he may delay six, twelve, eighteen, or even twenty-four hours, before proceeding to unite the tear. The operation may be performed at once or after the patient has had a refreshing nap and some stimulation administered. She is brought with her body lying transversely across the bed, the hips resting on the edge on a perineal pad, which drains into a bucket. If the bed have a spring or woven-wire mattress, and the centre sags so much as to prevent free drainage, a board similar to the fracture-board used in hospitals should be inserted beneath the springs. It is not necessary to give an anesthetic unless the patient be so nervous as to be unable to control herself, as the traumatism which has been sufficient to cause the rupture has also produced partial anesthesia of the soft parts by pressure. A little moral suasion by the physician will often quiet a nervous woman sufficiently to secure her intelligent co-operation during the operation. The patient will sometimes be able to hold her own legs flexed upon the abdomen by placing one hand under each knee, but it is always better to employ some form of leg-holder, if at hand, as it relieves her of the tension. The leg-holder described in the chapter on Technique is the one which is best employed. It is placed beneath the neck at about the seventh cervical vertebra, one end passing over the shoulder and in front of the clavicle, the other behind the opposite shoulder and through the axillary space between the arm and side of thorax, after which both ends are clasped about the legs immediately above the popliteal spaces. A competent nurse or assistant with clean-washed hands stands by the operator ready to assist.

The perineal and part of the supra-pubic hair is shaved off, and the vagina and external parts thoroughly cleansed, first with soap and water, and then with creoline solution (1 to 5 per cent.), or water sterilized by boiling. The patient's legs and thighs are covered with a clean sheet, and a large piece of gauze, several folds thick, laid between the thighs over the buttocks and genitals to prevent contamination of the hands, instruments and ligatures from the patient's body during the operation. An incision through the gauze exposes the field for operation. The surgeon takes his seat in front of the patient, so that his shoulders are almost on a level with the vulva. His instruments are spread out in an orderly manner on a low table to his right, on a clean sterilized towel, or in a tray, covered with hot water. To his left is placed a basin of warm water for occasional cleansing of his hands. An irrigator containing two quarts of water at a temperature of about 110° F. hangs back of him three feet above the level of the bed.

As the operator separates the labia with his left hand, the assistant directs the water on the parts which at the same time he gently sponges with pledgets of absorbent cotton.

The extent of the tear into the rectum and up into the vagina must be carefully noted. Ragged tits and tissue which resembles large blood-clots must be trimmed off evenly with a pair of sharp scissors.

The next step in the operation may properly be called the reduction of the compound and complicated laceration to a simple form of tear, by closing the rectal part of the rent. This is accomplished by passing a number of interrupted silk sutures, beginning at the angle and extending down to and including the ends of the sphincter, each entering and emerging on the torn rectal mucous membrane and penetrating the septum one-eighth of an inch, which is deep enough to secure a firm hold. These sutures are then tied from above downward and the ends dropped into the rectum. There then remains but the edges of a deep perineal and vaginal tear to be approximated. This is repaired by deep sutures of silkworm-gut, beginning in the vagina at the upper angle and passing down over the commissure on to the perineum and to the anus. Each suture extends to the bottom of the tear. They are tied from above down, as introduced.

The lowermost external suture must enter and emerge well behind the divided ends of the sphincter, sweeping deeply around in the septum, and thus binding the sphincter firmly together, while the silk sutures already introduced secure accurate approximation. About four silkworm-gut sutures to the inch are sufficient. The patient should lie quietly in bed, but she need not be restrained from turning over gently or lying on her side. The bowels, instead of being locked, should be freely opened on the second day by a laxative, followed, if need be, by an enema given with extreme care. If an enema be ordered, careful directions as to the introduction of the nozzle of the syringe should be given to the nurse, as great injury may be done by its careless use. The nozzle should be gently introduced, passed back toward the sacrum, and then the contents of the syringe slowly injected. After the bowels are opened, a mild laxative should be administered every day or so, as the fecal discharge must be kept soft and thus straining at stool prevented. The vulval orifice and the perineum should be well sprinkled with iodoform and boric-acid powder (1 : 7), and protected by a pad of sterilized absorbent cotton loosely applied and renewed three or four times daily. In eight or ten days the stitches should be removed by placing the patient in the same position as at the operation. The external sutures should be removed by drawing each to one side and cutting its loop, and then by pulling it toward the side on which the loop is cut. The inside stitches are exposed by elevating the anterior vaginal wall with a narrow Sims speculum or a retractor. Each stitch is caught in turn by a pair of forceps and lifted up, its loop cut, and the suture removed.

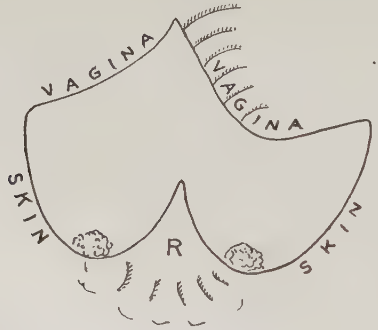
The Intermediate Operation for Complete Tear.—During the process of granulation and formation of the cicatrix, the wound of a complete tear presents essentially different conditions to the operator from those found either immediately after the reception of the injury or later in the secondary period, when the scar-tissue has been fully formed. From the seventh to the fourteenth days the wound-area is covered with delicate friable granulations, and its margins are marked by pink lines, which contract until finally only a linear scar remains. The operation at this stage may be performed with ease, and is followed by good results. The patient is brought, as before, to the edge of the bed, and a pledget of cotton saturated with a 10 per cent. solution of cocaine hydrochlorate laid over the whole lacerated area. In ten minutes the operator may take his seat in front of the patient, and with his thumb in the rectum and his finger in the vagina draw one side of the torn area into view and thoroughly denude it down to healthy tissue by scraping off all the granulations with a sharp scalpel. The older the wound the greater will be the difficulty of denuding its margins properly, and in some cases a sharp pair of scissors will be necessary to complete this part of the denudation. A freely-oozing surface with sharp margins is now exposed. The sutures are then passed as in the immediate operation.

Secondary Operation for Complete Tear.—The secondary operation is performed at any time after the formation and contraction of the scar-tissue is completed. It must be remembered, as it bears an essential relation to the denudation to be made, that the area of scar-tissue at this stage by no means represents the area of the original injury. The broad primitive wound-surface has contracted down into narrow lines more or less >——<-shaped, the lower extremities representing the position of the sphincter ends, the upper the commissure, and the transverse bar the lower margin of the recto-vaginal septum. The denudation must, therefore, be made to cover an area widely exaggerating the outlines of the scar-tissue.

The sphincter area is generally characterized by a shallow pit, often marked by little dimples at either extremity of the septum, presenting a more or less sharp border, beneath which pout a few tits of the deep-red rectal mucosa.

Before making the denudation the outlines of the area to be denuded must be mapped out with the point of a scalpel. This allows a rapid denudation to be made, without the error to which one is liable in making a free-hand denudation with the scissors alone. The first line may be made around the septum, splitting it at the rectal margin, and including both sphincter ends; this line is continued up on each side in a curve, convex backward to the nymphæ; from this point lines on both sides sweep into the vagina, along the lateral walls, until they meet in a point up in the vagina a half inch or more above the incision in the septum.

FIG. 195.

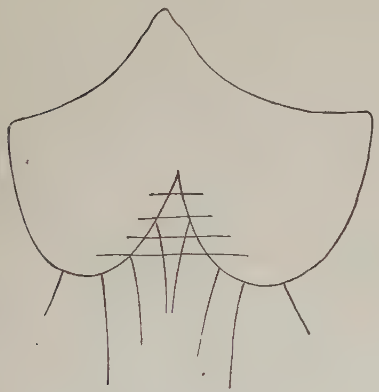


Rupture of the Recto-vaginal Septum: Ends of the denuded sphincter shown at the sides of the rectum.

The denudation is rapidly made with a pair of curved scissors and a tenaculum or rat-toothed forceps. The lower parts should be denuded first, so that that which follows is not obscured by the blood. The tissue is removed in long strips until the whole area is thus freshened.

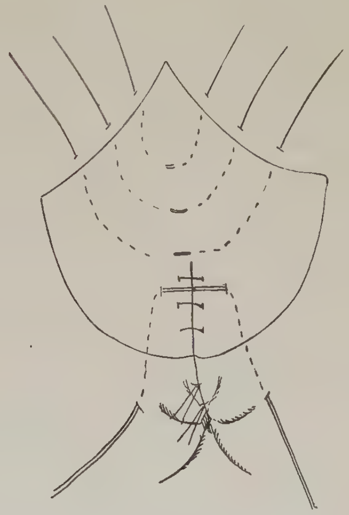
The sutures are introduced as described in the immediate operation. First, interrupted silk sutures closing the rectal side of the tear from the angle down to and including the sphincter, radiating out on to the skin surface. The sphincter sutures are carefully introduced, so as to bring the ends accurately together. The ends of the sphincter muscle are held together, and the delicate silk sutures relieved of a tension they cannot stand, by one or two silkworm-gut sutures, introduced well behind one of the divided ends of the sphincter, sweeping around in the septum, and appearing on the skin at a point corresponding to the point of entrance.

Fig. 196.



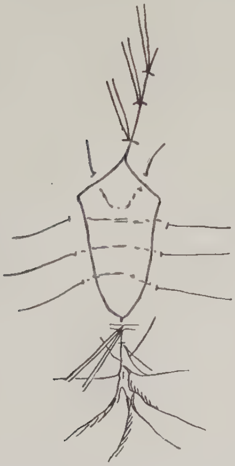
Rectal Sutures in Place.

Fig. 197.



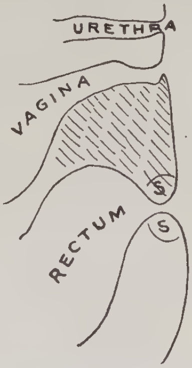
Rectal Sutures Tied, and Sutures in place on the Vaginal Surface.

Fig. 198.



Sutures within the Vagina tied; External Sutures in place.

Fig. 199.



Shaded Area indicates the extent of the Tear in the Recto-vaginal Septum.

The remaining sutures are passed, beginning at the upper angle of the denudation in the vagina, by introducing silkworm-gut sutures about four to the inch, and extending from the vaginal mucosa down to the bottom of the septum. By the time all the vaginal sutures have thus been introduced and tied the skin surface will appear as a shallow pit, requiring only a few silk sutures to bring the edges into accurate apposition.

After the completion of the operation the urine should be drawn, the vagina cleansed of blood and dried out with pledgets of absorbent cotton, iodoform and boric-acid powder sprinkled over the surface and between the lips of the vulva, and a pad of loose absorbent cotton laid between the thighs and held in place by a T-bandage. The urine should not be drawn after the operation unless the patient is unable to pass it. Each time after urinating the vulva should be carefully dried with absorbent cotton and powder, and fresh cotton applied. The bowels should be opened not later than the third, preferably on the second day, and should then be kept open by a daily evacuation. The patient should take a purgative pill or saline purge, followed by an enema in six or eight hours if a natural soft movement does not follow. Extreme care must be observed in giving the enema not to allow the point of the syringe to impinge on the stitches in its introduction.

It is not necessary to bind the limbs; on the contrary, considerable liberty of movement may be allowed without separation of the legs. The sutures should be removed, as in the preceding operations, in from eight to ten days.

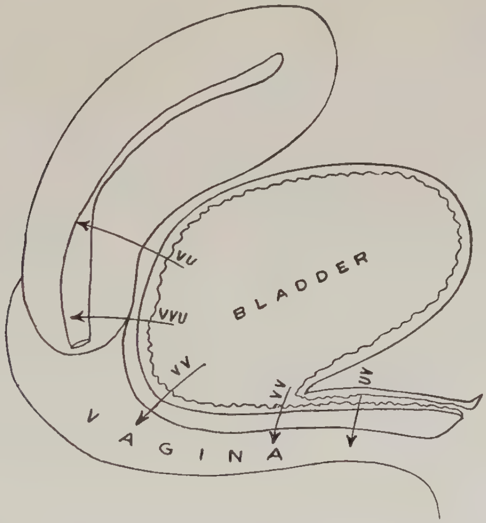
GENITAL FISTULÆ.

GENITAL fistulæ are abnormal avenues of fecal or urinary discharge, by means of which some portion of the urinary tract or the bowel communicates with the genital tract or the exterior of the body.

Fecal fistulæ are formed by a communication between the rectum or the small intestine, and the uterus, vagina, or bladder.

Urinary fistulæ are formed by a ureter emptying into the uterus or vagina, by the bladder discharging into the uterus or vagina, or by an opening from the urethra into the vagina.

FIG. 200.



The Various Forms of Vesical Fistulæ; *v*, *u*, vesico-uterine; *v*, *v*, *u*, vesico-vagino-uterine; *v*, *v*, vesico-vaginal; *u*, *v*, urethro-vaginal.

URETERAL FISTULÆ.

Ureteral fistulæ are sometimes congenital, discharging low down near the external urethral orifice: they commonly arise, however, from severe labors in which the laceration has extended through the cervix and beyond into the vault of the vagina and out into the broad ligament, tearing the ureter. After granulation and cicatrization are completed the ureter will be found discharging into the uterus or vault of the vagina.

Diagnosis.—This can be made by watching the mouth of the womb or the small orifice in the vault of the vagina, when the urine will be seen discharging at intervals of a few seconds to a minute or more in small jets. The patient complains of a constant discharge of urine, and yet she passes urine from the bladder in considerable quantity, which collects from the other kidney, at regular intervals. The injection of an aniline solution into the bladder brings no corresponding discharge from the fistula; on the contrary, its discharges remain clear. Especial care must be taken not to be misled in the diagnosis when a vesico-vaginal fistula, constantly draining the bladder, exists with a uretero-uterine fistula. If the ureteral orifice can be seen and a catheter introduced, it passes in the direction characteristic of the ureter; that is, to the back part of the pelvis and up toward the pelvic brim, and possibly over the brim up toward the kidney. The intermittently flowing urine can be collected from the outer end of the catheter.

Treatment.—The cure of a ureteral fistula is a matter of considerable difficulty, and should only be undertaken by a surgeon of considerable skill in plastic work.

When the ureter empties into the uterus high up out of sight, the corresponding kidney has been extirpated by some surgeons as the only means within their power of relieving the patient from the constant flow. The sacrifice of the kidney, however, is a procedure repulsive to the surgeon for the relief of a condition apparently so trivial. A better plan is the following: The patient is placed in the left lateral or the dorsal posture, and the posterior vaginal wall retracted with a Sims speculum. The anterior lip of the cervix is caught by a pair of bullet forceps and the uterus drawn down. If it is not evident, on account of the deep cervical laceration and the scar-tissue, on which side the fistula lies, the cervix is split up until the orifice is visible. If the side on which the fistula is located can be detected, the cervix is separated for half or two-thirds of its extent from the vaginal vault and gradually drawn downward. The cellular tissue is slowly and carefully peeled up on that side until the ureter is found at the fistulous orifice.

After freeing the ureter for from a half to one inch out into the cellular tissue, it is severed from its uterine attachment. An antero-posterior incision is made in the supravaginal portion of the bladder about a half inch long. The end of the ureter is cut off quite obliquely and turned into the bladder, and the incision closed in such a manner as to retain the ureter in place, by passing two or three of the sutures which close the incision in the following way: the first so as to catch one side of the incision except the mucosa, enough of the under wall of the ureter to hold it, and the opposite side of the incision. The next suture catches the bladder-walls a little more superficially, but includes the ureter in the same manner. Each of the following sutures proceeding from below upward is passed more superficially until the upper limit of the incision is reached. Care must be taken not to narrow this part of the incision so as to compress the ureter. Two or three superficial sutures catching the bladder-wall and outer coat of the ureter complete the union on all sides. The incision in the vault may now be closed by fine silk or silkworm-gut sutures, or it may be packed loosely with iodoform gauze.

Uretero-vaginal fistulæ may be closed by passing a sound into the ureteral orifice and dissecting up the ureter for about a third of an inch, opening the bladder just above the end of the ureter, turning its end into the bladder, and closing the incision by sutures on the vaginal side.

Another method is to open the bladder close to the ureteral orifice, and pass a catheter through the urethra and bladder and through the opening into the ureter. The short portion of the catheter visible in the vagina is then shut in by an oval denudation embracing both vesical and ureteral openings. Careful transverse union with deep sutures of silkworm-gut and superficial sutures of silk then establish the channel of communication between ureter and bladder.

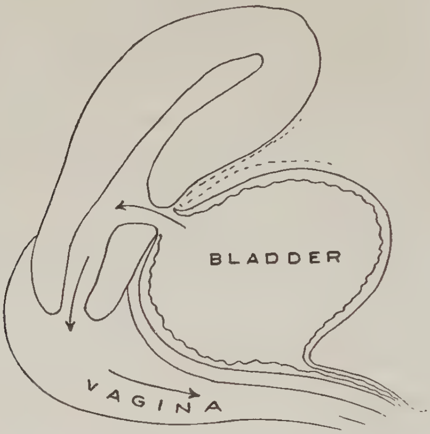
VESICAL FISTULÆ.

Vesico-uterine fistula; vesico-utero-vaginal fistula; vesico-vaginal fistula.

Vesico-uterine Fistula.—In this form of fistula there is a direct communication between the bladder and cervical canal, so that the urine escapes constantly through the os uteri externum. The demonstration of the vesical involvement can easily be made by injecting a colored fluid into the bladder, when it will be seen to escape from the cervix.

TREATMENT.—The musculo-fibrous tissue forming the cervical canal has a remarkable tendency to contract and close spontaneously any fistulous opening arising from a severe labor. If, therefore, but a short time has elapsed since the receipt of the injury, the operator can well afford to wait a few weeks or months until he sees what nature alone will be able to accomplish.

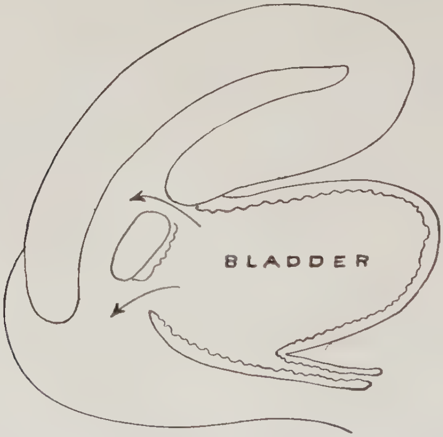
FIG. 201.



Vesico-uterine Fistula. Course taken by the urine indicated by arrows.

Persistent fistulæ may be closed one of three ways: Where the fistula is situated high up in the uterus and the amount of cicatricial contraction in the vagina prevents a proper exposure, the abdomen may be opened in the median line just above the symphy-

FIG. 202.



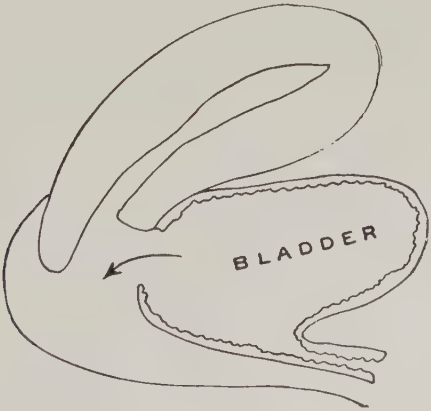
Vesico-uterine Fistula divided into two channels by a Septum of Scar-tissue.

sis, the uterus drawn out of the incision, the peritoneum incised transversely at the vesico-uterine fold, and the bladder carefully dissected from the uterus until the fistula is reached. The bladder should be emptied, the fistula cut through, and the opening in the bladder closed by a series of interrupted silk sutures, four or five to the half inch, including the whole wall down to the mucosa. The edges of the opening in the uterus should be freshened and drawn together by a row of interrupted silk sutures. After carefully cleansing the field, the peritoneum may be re-attached to the uterus, the field of operation entirely concealed, and the abdomen closed.

The *second method* is the reverse of the first, in that the vaginal vault is incised in front of the cervix, and the dissection carried up between the bladder and the uterus until the fistula is severed. This is closed by a row of interrupted silk sutures through the thickness of the bladder-wall, exclusive of the mucosa. The uterine opening may be left to itself, and a small strip of iodoform gauze pushed up, anterior to the cervix and under the fistula. The vagina is also loosely packed with gauze, which is renewed in three or four days. At the end of a week the pack is left out and a daily vaginal douche of a warm boric-acid solution given.

Third Method.—Where the fistula lies near the vault of the vagina the cervix may be split up into the track of the fistula, which is freshened from the bladder to the uterine surface. If necessary, sufficient cervical tissue should be cut away from the sides of this incision, so that the denuded fistula forms the apex of

Fig. 203.



Vesico-utero-vaginal Fistula, in which the posterior lip of the cervix is destroyed.

a wedge, and is closed when the sides of the cervix are brought together. Silkworm-gut sutures are applied by carrying from two to four through from the vaginal surface of the cervix; when these are tied the fistulous area is efficiently closed. The sutures should be removed in about ten days.

Vesico-utero-vaginal Fistula—In fistulæ of this character the opening is at the cervico-vaginal junction in front, median, or to one side of the middle line. The neighboring cervical tissue is cicatricial, and there is usually marked loss of substance. Where there is much cicatricial tissue in the cervix, it is best to draw the cervix downward and backward and dissect the bladder with the fistula free from the uterus, for a short distance above the vaginal vault. The fistula should then be treated by making a denudation extending from the vesical mucosa out on to the vaginal surface about a quarter of an inch broad.

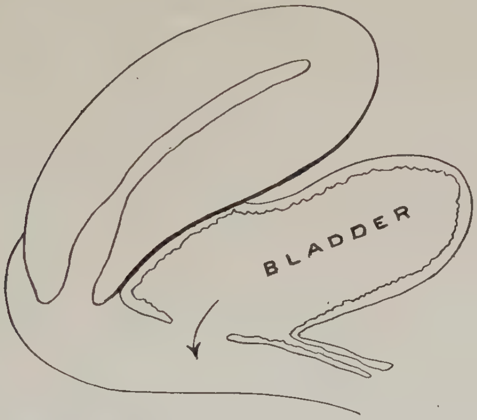
If the fistula is transverse to the axis of the vagina, the tissue above should be brought down to the tissue below by a row of silkworm-gut sutures, entered a short distance off from the denuded surface and passing down to the mucosa of the bladder. These sutures should be passed about five to the inch. They should be brought snugly together without constricting the tissues. Where the tissue pouts between these deeper sutures, the work of approximation may be completed by superficial silk sutures. If the long axis of the fistula is in the axis of the vagina, the stitches should be passed from side to side.

Vesico-vaginal Fistula.—A direct fistulous communication between the bladder and the vagina is the classical affection, brought within the reach of the surgeon's skill by the labors of Sims and Emmet. These fistulæ arise from protracted labors, in which the fistulous part of the bladder has been compressed sufficiently long, between the head of the child and the symphysis pubis, to produce a slough, which comes away in from three days to a week after labor, leaving the artificial opening. It may also arise from direct injury of the tissue while using the forceps; they are more often the consequence, however, of the want of the forceps to obviate the delay.

These fistulæ vary in size from a pin-point to one or two inches in diameter. The small ones are usually the remains of an unsuccessful attempt to close a larger fistula. In form, a vesico-vaginal fistula is round, oval, or irregular. One of the most important complications of the condition is a cicatricial contraction of the vagina and the presence of cicatricial bands extending from the fistula out on to the vaginal walls.

Treatment.—Where the vagina is contracted by scar-tissue, this must be divided in one or more places and stretched so as to afford an ample exposure of the fistula. The attempted closure of the fistula will succeed in direct ratio to the satisfactory exposure, which allows every step of the operation to be accurately conducted.

Fig. 204.

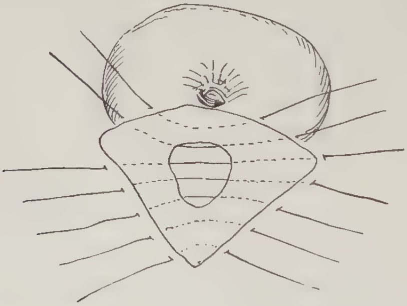


Vesico-vaginal Fistula; bladder adherent to the uterus along the darkly-shaded line.

If the vagina is eroded and coated with phosphatic concretions, this condition should be relieved by weak warm boric-acid douches—about a teaspoonful to the quart—and the erosions should be occasionally touched with a solution of nitrate of silver, about 5 or 10 grains to the ounce. The operation can be most conveniently performed with the patient in the lithotomy position, with well-flexed thighs held up on the abdomen by a leg-holder and the buttocks resting on the perineal pad for drainage. The posterior vaginal wall is then retracted by a Sims speculum. The denudation of the margins of the fistula is made by marking with a sharp knife the outer limit of the area to be denuded, from a quarter to an eighth of an inch from the edge of the fistula. With a fine right-angled tenaculum or a pair of long fine rat-tooth forceps the operator catches hold of a piece of the tissue thus outlined, lifts it up a little, and proceeds to denude the whole down to the mucous membrane of the bladder. The denudation may be accomplished with a sharp small-bladed knife, but it will be more easily made by means of a long pair of scissors, with delicate blades coming to a sharp point, slightly curved on the flat surface. No undenuded islets of tissue should be left to interfere with the union after approximation. The direction in which the tissues should be brought together depends upon the form and size of the fistula. In the case of small fistulæ it is immaterial; in circular fistulæ the vaginal tissue yields most readily in drawing the upper border down to the lower, shortening the vagina, and placing the scar across its axis. A long, oblique fistula should be approximated in the direction of its long axis. The edges of a round fistula cannot be accurately brought together, and it becomes oftentimes necessary to dissect out a V-shaped piece at each end of the fistula, rendering the opening elongated and its edges easy of approximation. Two sorts of sutures should be used in approximating the denuded margins—silkworm-gut for the deep, and fine silk for the superficial stitches.

The sutures should be applied by means of a small curved needle with a silk loop as a carrier. The first one may be placed at either end or often, conveniently, in the middle. If the fistula is a large one it may be tied at once, facilitating the even closure on both sides of it. Each silkworm-gut suture should enter the vaginal mucosa from an eighth to a sixteenth of an inch from the edge of the denudation and appear at the margin of the mucous membrane of the bladder, to re-enter at the mucous margin on the opposite side and reappear on the vaginal mucosa at a point corresponding to the point of entrance. No suture should be allowed to penetrate the mucous membrane of the bladder, else it is liable to become the point of a future fistula. Five or six similar sutures to the inch should be inserted, and one just at or just beyond each angle. These sutures should then be brought together and tied

Fig. 205.



Operation for Vesico-vaginal Fistula. Bladder dissected away from uterus, and stitches introduced preparatory to closure.

snugly, approximating the tissues without strangulation. The pouting tissue between these deep stitches should be approximated by fine silk ones.

The ends of the sutures should be cut about a half inch long, and a loose iodoform gauze pack placed in the vagina. Should there be any tension whatever upon the sutures, longitudinal incisions should be made deep in the scar-tissue on both sides of the fistulous opening until all tendency to tension is relieved. These incisions should be made short, so that they may be closed by stitches introduced in the direction of their long axes, thus further relieving the tension. This precaution is oftentimes absolutely necessary to the success of the operation on the fistula.

Under no circumstances should a sigmoid or other catheter be placed in the bladder for permanent drainage.

For the first three days the patient should be catheterized every three hours, after which she may be allowed to void her urine, taking care not to hold it longer than six hours, until the sixth day, when she may be allowed to pass the night without waking. In the case of smaller fistulæ the patient may void her urine from the very first. If the vaginal pack becomes wet or soiled, it should be removed at once, otherwise it may be left in place for two days, when it should be removed and the vagina allowed to remain empty. It is not necessary to use a vaginal douche at any time unless there is a discharge from the vagina. All the sutures should be removed in from eight to ten days.

Urethral Fistulæ.—A fistula following labor and involving the urethra is usually small and of its interior half—that part projecting into the vagina. Fistulæ in the long axis of the urethra are at times made artificially by Emmet's operation, to relieve vesical tenesmus. In closing the fistula, if small, the denudation may extend in a circle around it in a manner similar to the vesico-vaginal fistula; if large, a wedge may be cut out of the under part of the urethra with the fistula at its base, and the denuded surfaces brought together by silk sutures, extending down to the mucosa and applied close together and with extreme accuracy.

FECAL FISTULÆ.

Fecal fistulæ are abnormal avenues for the escape of the contents of the small or large bowel, either by the vagina or the bladder. The large bowel is almost invariably involved. The fistulous orifice, having no sphincter, affords an avenue for the constant escape of fecal matter when the contents of the bowel are fluid. If the fistula is small, opening into the sigmoid flexure or rectum, and the contents of the bowel formed, the escape of feces may occur but rarely.

One of the most common and distressing symptoms of these fistulæ is the more or less frequent escape of intestinal gases, which pass out with an audible bubbling or hissing noise, and by the evident odor, distresses the patient, so that she finally entirely avoids society and remains at home brooding over her ailment.

Recto-vaginal Fistula.—Recto-vaginal fistulæ are the most frequent; they consist in a communication between the rectum and the vagina through the recto-vaginal septum, at some point between the cervix uteri and the vulva.

Recto-vaginal fistulæ in the upper part of the vagina are not uncommon sequelæ of a cancer of the cervix uteri, due to a destruction of the upper part of the septum. In most of the cases of this class the disease is already in its last stages, and nothing can be done to cure the affection. The duty of the physician is limited to keeping the parts as clean as possible by repeated irrigations with warm water slightly medicated with boric or carbolic acid.

Recto-vaginal fistulæ in the lower part of the vagina and recto-vulval fistulæ commonly arise from imperfect union of the tissues after an attempt to repair a complete tear of the septum. When these fistulæ are reduced to the size of a pin's head, the closure may be effected by stimulating the tract with cantharidis or a little nitric acid.

Fistulæ may be closed by making a broad denudation, extending from the sound tissue, around and deep down into the fistula, and then passing sutures, one or two deep, of silkworm-gut, and the remainder of silk, from side to side, just as in a vesico-vaginal fistula operation. A loose iodoform gauze pack should be placed in the vagina. On the eighth day all sutures should be removed.

When the fistula is bounded on one side by a thin band of cicatricial tissue or is much over a sixteenth of an inch in diameter, the best course to pursue in its treatment is usually to cut through the scar-tissue, thoroughly denude the fistulous area, thus reproducing the original injury, and secure snug apposition throughout with greater ease and without constricting the tissues.

The suture and after-treatment of these cases is similar to that of the cases of complete tear of the septum.

When the small intestine opens into the bladder at some point within the upper pelvic cavity, the only plan of treatment is to open the abdomen, find the fistulous tract, and sever the adherent intestine from the bladder, taking care, when necessary, to sacrifice rather the bladder than the bowel. This part of the operation will usually prove difficult, owing to numerous surrounding adhesions among the bowels, which must be separted with pains-taking care. After loosening the knuckle of bowel from the bladder, each viscus should be carefully protected by thick pieces of gauze to avoid contamination of the surrounding peritoneum, and the opening, first of the intestine, then of the bladder, should be closed by a sero-muscular or a rectangular suture.

DISTORTIONS AND MALPOSITIONS.

Distortions and malpositions of the uterus may result from incomplete laparotomies or those in which drainage has been employed. Adhesions forming around the drain produce the most fantastic twists and bends in the uterus. Neoplasms and diseases of adjoining organs also cause flexions and displacements of the uterus, but such conditions will not be described here.

The more common forms are anteflexion, retroflexion, retroversion, prolapsus, and inversion. It must be born in mind that there is no position of the organ which is normal to all women. The uterus is a movable body, varying in its position in answer to the condition of the bladder, rectum, and other pelvic and abdominal organs. It must not be assumed because a given womb be found with its fundus behind the long axis of the pelvis, in a retroflexed or retroverted position, or before it, in an anteverted or anteflexed position, that the symptoms from which the woman is suffering come from the womb. Any of these positions may exist and be perfectly natural and normal to that particular individual.

Pathological Anteversion is described by some authors, but we have never seen a case unless the uterus were displaced by a neoplasm, or adhesions or the distortion of some adjacent organ was to blame for the malposition. The uterus naturally follows the movements of the bladder, and is distinctly normally anteverted when the bladder is empty.

ANTEFLEXION.

This occurs in two chief forms. In simple anteflexion the axis of the cervix and the cervix itself occupy to the vagina a normal relation. But the body is sharply bent upon the cervix. These uteri are found high in the pelvis, drawn up toward the promontory of the sacrum. The uterus is somewhat fixed in that position, limiting downward mobility. The result is that while the woman is erect the entire intra-abdominal pressure falls directly upon the posterior aspect of the uterus, and the condition is still more aggravated. Whether this flexion be due to inflammatory shortening of the utero-sacral ligaments, thus drawing up the cervix, is not proven, but possibly such is the case. The cervix is short and fairly well open, but sometimes stenotic. The sound shows the depth of the uterus to be normal and the point of flexure at the internal os, or the whole organ may be of much decreased size (infantile uterus). The posterior wall opposite the flexure is thinned, while the anterior is thickened. The endometrium is usually atrophied and poor in lymphoid elements. This is the common picture. But there may instead be marked hypertrophy. The cervical canal has lost much of its slit-like form, and is more tubular.

Fig. 206.

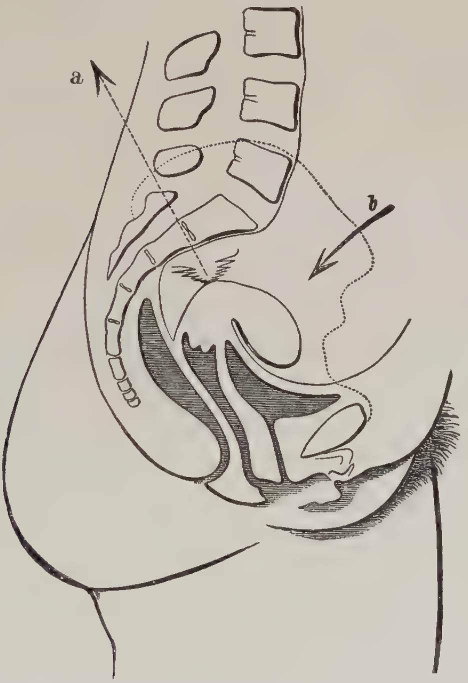


Diagram of Pathological Anteflexion arising from contraction of the folds of Douglas: *a*, direction of the traction of the folds; *b*, that of intra-abdominal pressure.

Symptoms.—The patient usually gives some such history as this: she menstruates regularly. A few hours before the flow appears there is a good deal of pain located behind the pubes, intermittent and crampy in character, or continuous, severe, and with spasmodic exacerbations. A clotted flow appears which affords relief for a time. She uses one or two napkins the first day or so, and after lasting two or three days the flow becomes thin and watery. It is followed for a longer or shorter time by a milky discharge which is unirritating, but disagreeable. When the patient is up she has to urinate frequently, but is not troubled at night. Upon examination the uterus is found high up, the cervix small, and the fundus is easily detected as a rounded nodule above the anterior lip. Rectal examination is exceedingly valuable, in that it determines the absence of the fundus from its normal position. If it is necessary to use the sound, the instrument shows the flexure and its degree. Before being passed it should be bent to the apparent angle of the flexure, and no force should be used in its introduction. Downward traction on the uterus by a tenaculum lessens the degree of bend and facilitates the introduction of the instrument. The cervical plug of mucus is opaque and milky or clear, seldom purulent. Secondary cervical erosion and inflammation is not common. The appearance of the cervix varies greatly in different cases. Commonly the external os is a rounded hole, and the cervix more or less conical. The narrowing of the canal may be so marked that a probe is with great difficulty introduced. This is of no great diagnostic importance, as it is rare that the outlines of the uterus cannot be detected by the bimanual touch. These cases are commonly associated with vaginismus in the unmarried and with dyspareunia and sterility in the married.

The other common form of anteflexion is still more interesting, and may be designated as *anteflexion with retroversion.* The body of the uterus occupies nearly a normal relationship to the bladder and pelvic walls, or may be somewhat retroverted. The cervix is so sharply bent upon the body that its axis is the same as that of the vagina. It is always hypertrophied, and may even be so long as to project from the vulva. The whole organ is somewhat lower in the pelvis than normal. The condition is really one of hypertrophied cervix bent upon the body, with, possibly, some retroposition and descent of the latter. The greater the hypertrophy the more the descent and backward displacement of the body.

Examination shows the enlarged cervix, often with a conical end and circular os externum. The body is not always felt per vaginam, but is readily found by rectal examination.

Because of the elongation of the cervix, introduction of the sound is difficult. The total length of the canal is increased, but that of the body is about normal. If the organ be pushed high in the pelvis, the cervical elongation decreases, and the fundus falls forward on the bladder. The posterior lip is much longer than the anterior. The endometrium is the seat of hypertrophic changes, especially at the os internum. Downward traction increases the backward tendency of the body.

It is an interesting fact that in all these cases of anteflexion the bladder is attached to the uterus abnormally high.

So far, no attempt has been made to explain the pathogeny of these two lesions. That simple anteflexion is associated with shortening of the utero-sacral ligaments is undoubted. Whether this shortening be congenital or acquired may possibly be determined. Transverse sections of the child show that the os internum occupies a position relative to a line drawn from the symphysis to the end of the last sacral vertebra, much higher than in the adult. If any disease of infancy should decrease the elasticity of the utero-sacral ligaments, as the body grows, the cervix being fixed, it will fall forward on the bladder. The continuous force of intra-abdominal pressure, together with its increase by lacing, adds to the natural tendency the uterus has to bend. Also when the organ is gorged with blood at the menses, and the body erect with that pressure, still more will it bend.

In infancy the cervix is relatively large, but the hypertrophy we see accompanying certain flexions cannot be accounted for. It is utterly unlike any that occurs as the result of inflammation in the adult organ. Probably the process is begun even before birth or in early infancy. Inasmuch as the cervix is first developed, the explanation may be found in some stimulus, giving this an impetus too early or too strong, resulting in unbalanced growth later on.

These patients have more flow than those suffering from simple anteflexion, and the pain is not so great; the blood does not clot as much. There is the same leucorrhea, and more of it. Backache and pelvic tenesmus are constantly present. Vaginismus and local nervous disturbances are common. The married are usually sterile.

An explanation of the symptoms is here called for. The dysmenorrhea is due, not to the obstruction to the flow of blood, as stated by authorities, but solely to the manner in which the flow is produced, and the character of the blood. The epithelium, instead of melting off, comes away in blocks and shreds. Casts of whole follicles may form. The blood is produced in too sudden a manner at first, and is sparsely mixed with lymphoid cells, and hence coagulates, instead of remaining fluid. The pain is produced because the endometrium is altered in essential particulars and because of the blood-clots. In those cases where the blood clots least the dysmenorrhea is least. We grant that all this is secondary to the flexure, the bend causing altered nutrition and perverted nerve-impulse. But it is to the altered condition of endometrium that the dysmenorrhea is due. The vaginismus and dyspareunia are purely secondary and dependent upon the nerve-irritation produced by the dysmenorrhea.

The subject of *sterility* of uterine origin can be dismissed in a few words.

Women with these flexed uteri who marry early in life, before the endometrium has undergone the structural changes described under the head of "Simple Endometritis"—conceive as readily as other women, although they may suffer from the most severe dysmenorrhea from clotting of the blood. It is as illogical to assume that a canal which admits a Simpson sound will refuse entrance to a spermatozoon, as that a spermatozoon may penetrate the minute Fallopian opening and yet not be able to enter the cervical canal in such cases as these under discussion. The obstruction theory of Sims and his followers will not meet the objections raised by more recent physiological and pathological investigations. The whole fabric of the uterus is made for the proper management of the placenta-forming endometrium. If this be markedly and generally diseased, its chief function is gone. The requirements on the part of the woman to conception are—patent tubes, discharge of an ovule, melting off of the epithelium from the surface of the endometrium, and engorgement of the retiform tissue by lymphoid elements. If these requirements are not satisfied, conception does not occur. Flexure undoubtedly produces degenerative changes in the endometrium, but it is those changes, and not the flexure, which prevents conception.

Therefore, with a wrong interpretation of the menstrual function, and seeing but the grosser lesions, gynecologists have been but partial in their treatment of these lesions and the attending sterility.

Treatment.—The indications seem to be to relieve that lesion which produces the changes in the endometrium and give the woman a new cystogenic membrane. In the first form of anteflexion, the uterus is dilated thoroughly and washed out with boracic-acid solution. Now comes the essential part of the operation, for which the dilatation is merely preparatory. As thoroughly as possible the whole inside of the uterus is curetted, removing every possible vestige of the endometrium. The cavity is again washed out. Iodoform gauze is then tightly packed into the uterus and the vagina lightly filled with the same, this being left in six days. It is then removed and no further treatment given.

The operation is best done two weeks before a period. The patient is allowed out of bed on the third day; she should remain in the house three weeks. If the operation is done for sterility, and if there be no suspicion of gonococci in the husband's urethra, connection should take place two days before the menstruation and immediately after. No pessary is used or needed.

Anteflexion with retroversion is treated on the same principle—removal of the endometrium and relief of that condition which originally produced it. Here the latter is more difficult than in simple anteflexion. The uterus is steadied by the bullet forceps, and not drawn down much; the canal is dilated cautiously, to half an inch, after this the uterus is washed out, thoroughly curetted, again irrigated and packed tightly with iodoform gauze, and the usual vaginal dressing applied. The packing is removed on the fifth day, and a light drain of gauze introduced just through the internal os; no pain is produced. This second dressing remains in three days more, and another is applied. The drains should be introduced for two weeks. The curettage is the important feature. Pessaries are out of place in the treatment.

After the operation, atrophy of the elongated cervix rapidly supervenes. Also, the uterus, relieved of the weight of the enlarged cervix, rises in the pelvis and assumes a more forward position. Should the cervix be much elongated or hypertrophied, it should be amputated. Both the amputation and the curettement may be carried out at the same sitting.

If it be decided to amputate the hypertrophied cervix, not more should be removed than two-thirds of that which it is desired shall be the ultimate decrease in size. Atrophy incident to the operation will remove the rest. If the hypertrophy be so great as to require amputation, the operation for amputation, to be described, is recommended, and at the same time the cervix is dilated and the uterus curetted.

There are still those in America who teach and practise the use of *stem pessaries.* Inasmuch as for years we were so placed that daily we could observe the results of their use, we feel qualified to speak on the subject. Those who use them consider the cervical stenosis as the objective point. Having made incisions of the cervix, the uterus is not washed out and is not curetted, but dilatation is done. The pessary is then introduced and retained in place by a cotton tampon in the vagina. It is removed in three days, and an application of iodine or carbolic acid made to the endometrium, and the stem again put back. If the uterus be simply anteflexed, the stem will stay in without support; but if the cervix looks out in the axis of the vagina, the stem must be retained in place. These stems are straight and forced into place in the flexed canal. They act, according to those who employ them, by straightening the canal and establishing drainage. They keep the incised and dilated canals open without doubt, and, as they are left in during the menses, connection, and douching, the discharges are very profuse—more profuse, in fact, than before they were used; hence their advocates consider that they are draining away discharges, when in reality they are producing them. Under their use and the applications fair success is obtained after six months' treatment.

Now, if the sterility and dysmenorrhea were due, as maintained by nearly all stem-pessary men, to the stenosis, they should be at once cured by the operation. But these gentlemen treat the endometrium for a long time to "get the secretions healthy," they considering that spermatozoa will not live in purulent secretions, in spite of the fact that the emissions of every gleety man are filled with them. They do not know that the fault lies with the structurally changed endometrium. Their applications do some good, but it is tardy and comes when the patient is about worn out with treatment. The percentage cannot be estimated accurately, but we have known so many inflamed tubes come from this treatment that we believe they do nearly as much harm as good. If used in a case of simple endometritis, that speedily becomes purulent.

The stem pessary requires months to accomplish a result; it produces pus, it frequently causes inflammation in the tubes and peritoneum, it does not drain, and it does not cure endometritis. The sole beneficial feature in this method lies in the application of iodine and carbolic acid. Contrast this with the procedure offered here. We have seen conception follow within five days after a curettage, and it is the usual result at the second or third period following the operation. There is produced no pus, there is no long treatment, there are no accidents, and the results are usually immediate relief from the dysmenorrhea.

It but remains for us to say that the treatment of anteflexion by the stem pessary is not based upon accurate ideas of the lesion and the function of the endometrium.

We repeat, the object of the whole operation is to give these women new endometria, forming under propitious circumstances, and as soon as possible to obtain conception in the married. In the unmarried the relief from the dysmenorrhea is often permanent.

There is another procedure which, while it has little effect upon the condition of the endometrium, affords temporary relief from dysmenorrhea. We refer to *dilatation* without curettage. The use of the dilator without ether is exceedingly painful in these sensitive women; it is of but temporary benefit, and must be repeated many times; it is done under conditions where exact asepsis is impossible, and therefore has attached to it the risk of infection; and, furthermore, it occupies a middle position between *operation* and *treatment*, with none of the good results of the former, and all the dangers of the latter, in most hands. Long after-treatment of these nervous women is inadvisable, because it keeps constantly before them their malady. They become hypochondriacal and utterly miserable, and prone to magnify their really trivial troubles.

There are many cases where it is difficult to decide what operation to do. The two factors which guide us in the selection are the amount of cervical hypertrophy and the axis of the cervical canal to that of the vagina, this being normally about 50°–60°.

In all the intra-uterine manipulations the most precise asepsis must be observed, lest we convert a simple into a septic endometritis and extend a septic endometritis into a tubal or peritonitic involvement. A woman who has once had either complication occupies a position in society far different from one who has not, and goes through her life with the possibility of a celiotomy ever before her.

With this caution we may say that dilatation may be done so as to do the patient no possible harm if the proper precautions be taken. Still, it is an undoubted fact that the instrument has been most recklessly used. If curettage is not adopted, dilatation once every month, a few days before menstruation, will give most patients much relief from pain. But our experience is that the method is applicable to cases of short cervix only.

LATERAL FLEXIONS.

These are generally the result of some inflammatory lesion outside the uterus, such as adhesions, and of that common form of contraction in one broad ligament which follows puerperal septic salpingitis. They are not amenable to extra-peritoneal treatment, and are purely secondary.

ANTEFLEXION COMPLICATED BY THE MENOPAUSE.

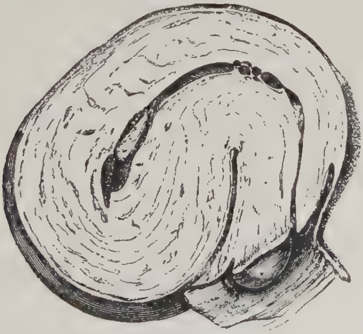
When the menopause occurs in old maids with anteflexion, it produces a very distressing train of nervous phenomena which properly come to the attention of the gynecic surgeon. The fundus rapidly atrophies and leaves the cervix proportionally much enlarged. The cervix also finally retrogrades, the nerves are caught and compressed in the shrinking tissue, and the discharges are retained. The os is but pin-hole in character, and the whole cervical canal much decreased in dimensions. These uteri are originally but poorly and irregularly developed, their owners go through life suffering from dysmenorrhea, and when the menopause comes the atrophy takes place irregularly. They are complicated by a simple endometritis. All the treatment that is needed is dilatation of the cervix. The curette and gauze packing are seldom required for the endometrium, but it is better to introduce a filament of gauze into the cervix, leaving it in for a week, with a gauze vaginal dressing. No after-treatment is necessary.

These cases are often subjected to the stem pessary and electrical current. Being high-strung, nervous, almost irrational creatures, long continued local treatment has a deleterious effect upon both their mental and moral qualities. Medicinal treatment can give them little or no relief. If surgical aid be refused it becomes necessary to resort to opiates in some form at each recurring monthly period. Such treatment, although effective, is exceedingly dangerous, and should only be practised when all else fails. Such methods of relief as are given in the chapter on Dysmenorrhea should be tried before resorting to the use of this drug.

RETROFLEXION AND RETROVERSION.

Congenital retroflexion is exceedingly rare. It is found in single or sterile married women. The uterus is invariably back in the pelvis and the organ sharply bent upon itself, the flexure being at the os internum. The cervix is normal or slightly below normal in size. The flexure is exceedingly sharp, the fundus occupying the cul-de-sac. In rare cases no sulcus can be felt between the cervix and the body. The body is usually adherent to the rectum, rendering the deformity irreducible. The anterior wall opposite the internal os is so thinned as to be but membranous, while the posterior is much thickened. Schultze attempts to explain uterine flexures by ascribing them to intra-abdominal pressure, acting upon the uterus at some point fixed by inflammatory tissue, and describes a retroflexion due to fixation of the cervix anteriorly. The dilating and contracting bladder renders such a condition all but impossible. It is surely so where the flexure is congenital. So rare is this condition that Winckel describes but four cases. The uterus is close to the sacral curve and not lower than normal. It seems to be displaced directly backward. The fundus presses upon the rectum, and the total length of the uterine canal is decreased. All have some form of endometritis, rarely purulent. The ovaries and tubes are usually normal in position, and do not follow the fundus. The symptoms are uniform, with trifling variations: continuous, severe backache; pelvic tenesmus; difficult defecation and the passage of small stools; frequent headaches (occipital), especially at the periods; dysmenorrhea, severe and identical with that accompanying anteflexion, with a scanty flow and passage of clots.

FIG. 207.



Extreme Retroflexion.

Bimanual examination reveals the direction of the canal. The bladder is attached to the uterus below the level of the internal os. Rectal examination, combined with abdominal palpation, detects the degree of flexure, and the intimate approximation of the cervix and fundus.

TREATMENT.—The indications are for the establishment of thorough drainage. Replacement is impossible by the use of the sound or by manipulations, even under ether.

The Operation.—The posterior lip is incised through from above the internal os; the uterus is dilated, curetted, and irrigated. The hemorrhage is free, inasmuch as the circular vessels are cut. To check this, tight iodoform gauze tamponade is indicated, to be retained in place by vaginal gauze tampons for at least two days. It is then removed and gauze packing substituted. The treatment lasts for three weeks. The headaches disappear, as does also the dysmenorrhea. With the short vaginæ and structurally altered uteri, we cannot see how Alexander's operation or ventrofixation could possibly be of benefit, and pessaries are worse than useless.

ACQUIRED RETROFLEXION AND RETROVERSION.

ETIOLOGY.—Retroflexions and retroversions caused by tumors will not be described.

Retroposition of the uterus may ensue as a result of conditions in its own tissues and from lesions in the supporting structures. Any factor tending to enlargement of the uterus, which at the same time softens its walls, may cause retroposition. Such are pregnancy, septic endometritis, and subinvolution. There is so much discrepancy in the relative frequency of retroflexion and retroversion given by different authors that it is impossible to furnish an accurate ratio. Retropositions are frequently found after the adnexa of both sides have been removed, without adopting some means to retain the uterus in its proper position.

The cervix being more or less a fixed point, the heavy and softened body falls backward. A very common cause is too long confinement in the dorsal position in bed after labor, especially as the uterus is apt to be, under these circumstances, in a pathological state.

A sudden fall from a height, producing rupture of the round, broad or utero-sacral ligaments, a sudden increase of the intra-abdominal pressure, as the body being crushed under a weight, may produce retropositions of the uterus by interference with its supports; or, they may be produced by a lesser and more gradual increase in the intra-abdominal pressure, operating for some time upon a softened uterus. But the common association of causes is a break in the pelvic floor, together with uterine enlargement.

The chief single cause is rupture of the perineum. The walls of the collapsed bladder completely fill the space between the uterus and pubes; therefore displacement forward is possible to but a very slight degree. The perineum being torn, the sphincter ani does not feel the full opposing force of the levator ani in defecation, so more or less straining at stool becomes necessary. The result is that the feces, meeting the closed sphincter, seek a relief from the intra-abdominal pressure in the direction of the posterior vaginal wall, causing it to bulge forward. This drags on the posterior lip of the cervix, the uterine axis approaches that of the vagina, and the whole organ descends a little. If the uterus be enlarged as from a recent pregnancy, it will, yielding to the pressure from above, either fall backward or its fundus will bend upon the cervix, causing a flexion.

Retroverted and retroflexed uteri are as low in the pelvis as are the anteflexed uteri high up.

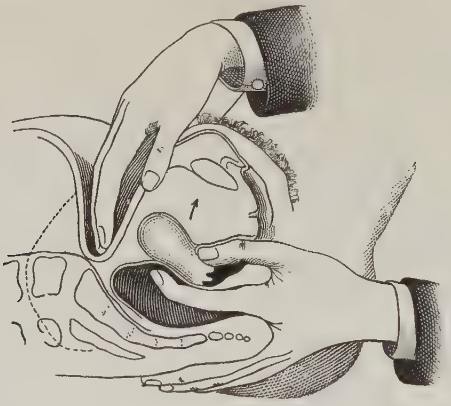
The element of intra-abdominal pressure is operating continuously, and may, apart from defecation, cause the displacements mentioned, where the supports are broken, more especially when there is a lack of tone in the uterine muscle.

Septic conditions, especially those acutely established in an aborting uterus, frequently result in acute retroflexions, which disappear in a few days if the sepsis is removed, and the uterine muscle regains its tone. Pelvic peritonitis and inflammatory processes in the tubes and ovaries also cause retropositions by the formation of false bands.

The results of persistent retroflexion and retroversion are, endometritis from poor drainage and the formation of adhesions to the bowel. In addition to this, certain irregular changes take place in the muscularis, such as thinning of the anterior and thickening of the posterior wall. The broad ligaments are twisted and the venous circulation retarded, leading to a varicose condition of the pampiniform plexus. This in time predisposes to prolapse of the ovaries and tubes. Retroposition is the first step to prolapsus.

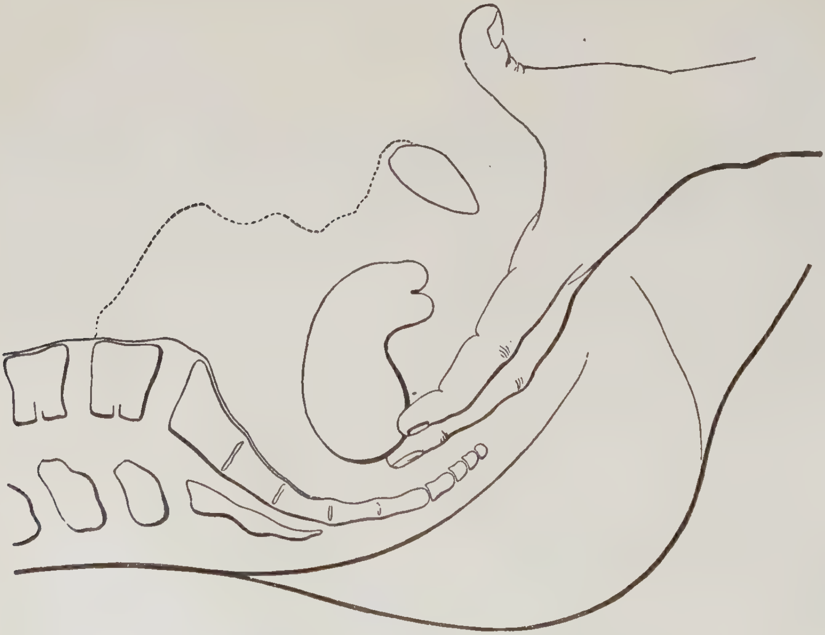
Symptoms.—Women with retroversion or retroflexion complain more of backache and a dragging sensation in the pelvis than of any other symptoms. These may be so great as to amount to actual inability to walk. Leucorrhea is a prominent symptom, the discharge being milky or purulent. As a result, erosions of the cervix may occur. In septic or inflamed uteri every movement is felt in the tender organ. Defecation is difficult and often painful, hence

Fig. 208.



Ventro-recto-vaginal Reduction in Uterine Retrodisplacement.

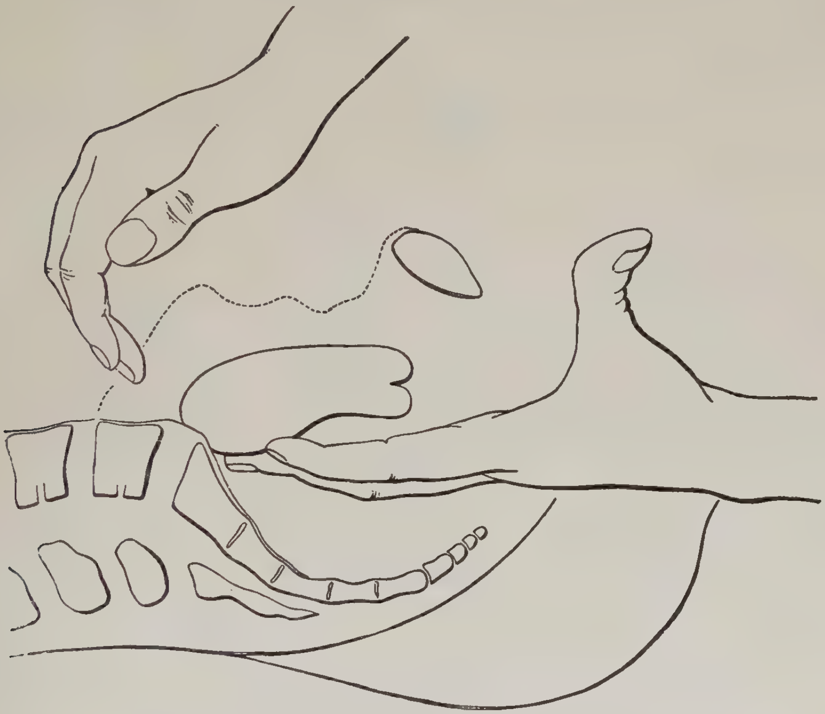
Fig. 209.



Bimanual Reposition of the Retroflexed Uterus: first step.

postponed as long as possible. Costiveness results, with the common accompanying train of anorexia, foul breath, etc. Dragging upon the bladder often causes the sphincter vesicæ to leak, and dribbling of urine occurs upon laughing or exertion. Pains down the front of the thighs are frequent, and are increased on motion. Occipital headache and burning pain in the nuchæ, inability to concentrate the thoughts, melancholia, hysteria, and peevishness are common reflex nervous phenomena. The endometrium commonly becomes hypertrophic, and gives rise to increased menstrual flow. This, however, is not painful as a rule, owing to the fluid condition of the blood and patency of the canal.

Fig. 210.



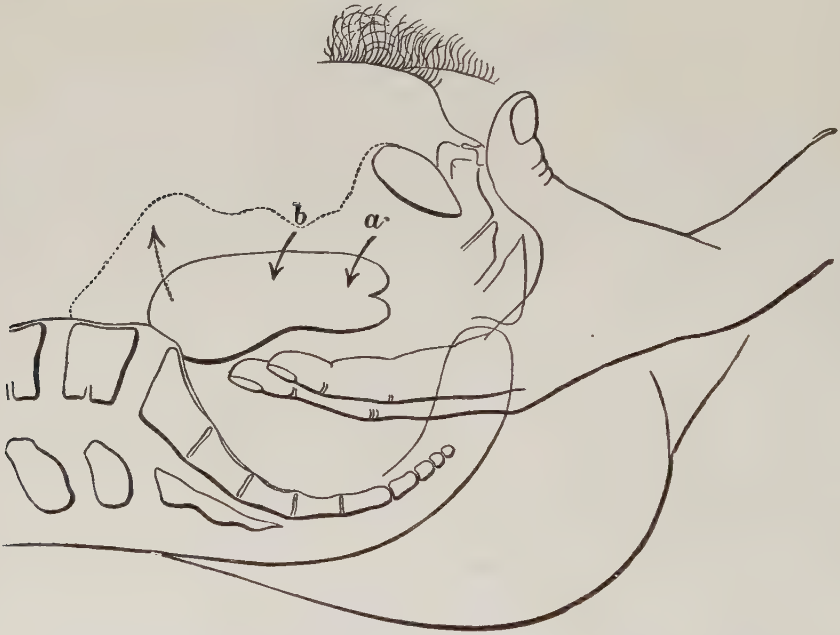
Bimanual Reposition of the Retroflexed Uterus: second step.

Upon examining these cases of posterior displacement, the uterus is found low in the pelvis. If there be pronounced retroversion, the finger first touches the posterior lip of the cervix, and the uterine tissue continues from this point backward and downward. There is absence of the body from its normal position, and rectal touch demonstrates its presence in the cul-de-sac in retroflexion; in retroversion the body presses on the rectum higher up. In aggravated cases the ovaries also lie so low as to be easily felt to either side of the uterus. The fundus is tender, and more or less enlarged according as the displacement occurs post-partum or not.

The local tenderness and size, with many of the subjective symptoms, vary greatly according to the causative factors.

Retropositions of the post-partum uterus, or the organ materially softened by endometritis and metritis, have commonly both versions and flexions associated. Therefore one author will describe a certain case as retroflexion, while another places it as retroversion. If the uterus be flexed to any extent, there will be a convexity on the anterior surface of the organ where normally there should be a concavity, and the reverse on the posterior border. The finger in the rectum, with abdominal palpation, makes the diagnosis absolute, for every portion of the organ can thus be reached. In all cases, when necessary, the sound will demonstrate the direction of the uterine canal. It is a matter of importance to determine whether or not the uterus can be replaced or whether it is adherent to the rectum. Before doing this one should know that there is no suppurative focus in the tubes or ovaries. If also there be no septic endometritis, one of four methods may be adopted: replacement by the

FIG. 211.

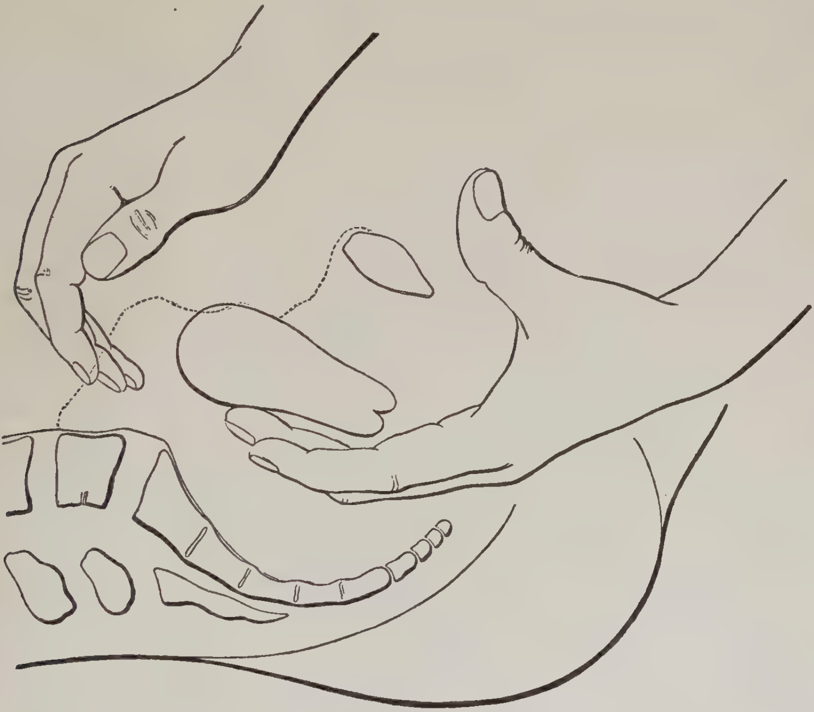


Bimanual Reposition of the Retroflexed Uterus; elevation of the fundus by the internal hand.

hands alone, by the knee-chest position, by the sound, or by the repositor.

In thin women only can the uterus be replaced with ease by the unaided hands. In fat women it is often rather difficult, and is then best accomplished by means of the finger in the rectum, or by the knee-chest position. These two methods have great advantage over all others in that they are applicable to cases with septic endometritis, for they do not necessitate invasion of the inside of the uterus. They should be tried faithfully and persistently before resorting to other means. These two methods of replacement are the only ones which give good results. Rare indeed must be the cases in which they fail when properly tried.

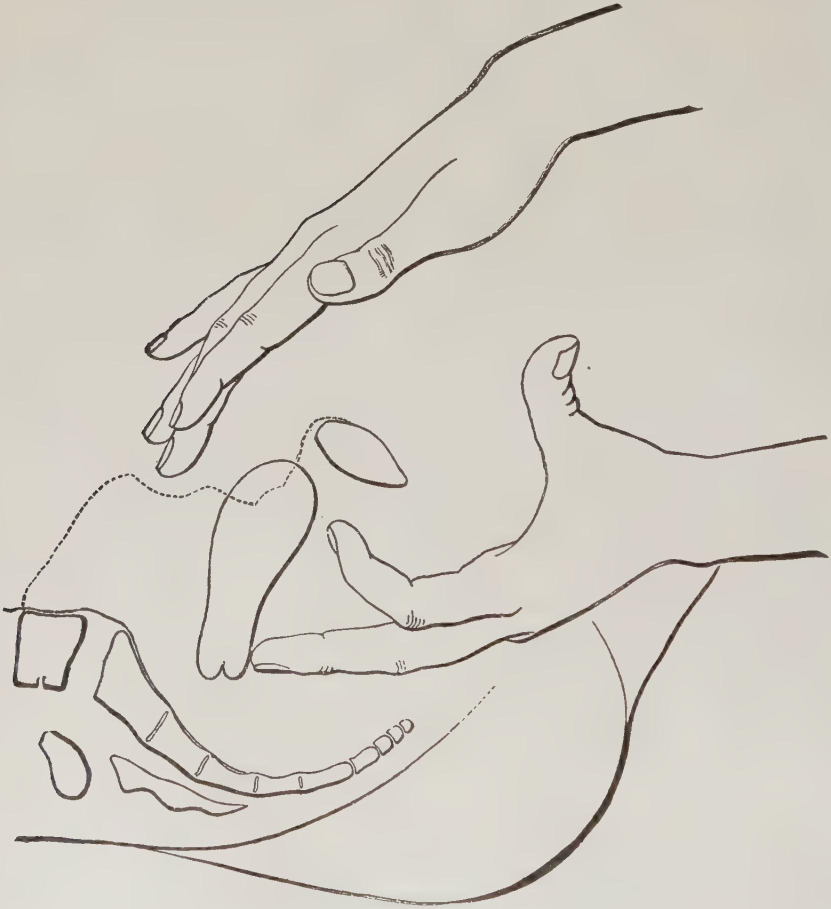
Fig. 212.



Bimanual Reposition of the Retroflexed Uterus; the external hand taking charge of the fundus.

Bimanual Reposition: The patient assumes the half-reclining posture, with the knees flexed on the abdomen and the clothes perfectly loose. The finger is introduced into the vagina and passed behind the cervix. The tip is gently bent and attempts are made to pull the cervix forward toward the symphysis pubis. The free hand on the abdomen is crowded down hard, following the curve of the sacrum. The object is to keep as far back in the pelvis with this hand as possible, and to pin the retroposed uterus against the symphysis. No attempt has so far been made at reduction—merely the preliminary step of fixing the organ. The vaginal finger is now carried behind the body, which is lifted as high as possible along the curve of the hand pushed into the abdomen, until it is well in front of the fingers of the free hand. This is then moved slowly forward toward the pubis until resistance is met with. This maneuvre bends the body of the uterus upon the cervix.

Fig. 213.

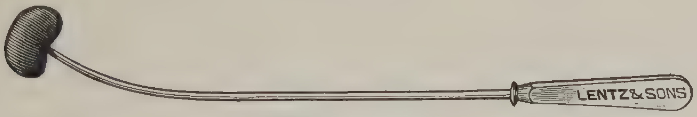


Bimanual Reposition of the Retroflexed Uterus, completed.

The vaginal finger is then placed in front of the anterior lip of the cervix, and this is pushed upward and backward to the promontory of the sacrum, while at the same time the body is held anteriorly. The last movement is to suddenly push the cervix forward in a straight line toward the symphysis by the finger behind the os tincæ. The uterus is now in an anteverted position. If the cervix is held high in this position while the patient gets up and stands, the intestines will fall behind the uterus and the intra-abdominal pressure keep it in place.

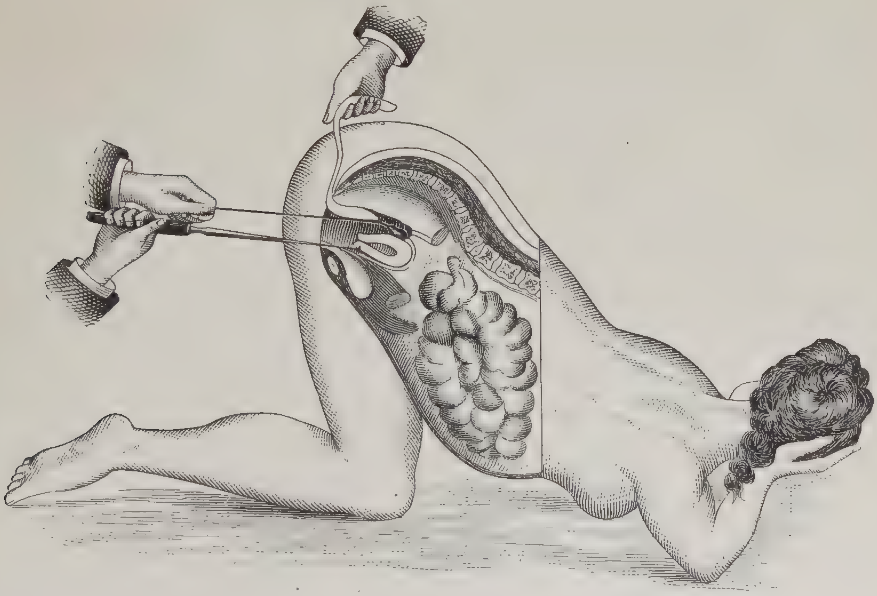
Knee-chest Reposition.—The patient is placed in the knee-chest position and the perineum is lifted up with a Sims speculum. This at once allows the intestines to fall away from the pelvis into the abdominal cavity. The cervix, thus exposed, is caught up with a tenaculum and drawn well forward toward the vulvar orifice. By this movement the fundus is drawn forward sufficiently for it to swing past the promontory of the sacrum, by the aid of gravity, which it will do in a small proportion of cases. Should it not do so, as the cervix is drawn forward, the fundus is lightly pressed upon by means of the repositor shown in the cut, and thus forced

FIG. 214.



Uterine Repositor.

FIG. 215.



Replacement of Retrodisplaced Uterus by means of the Uterine Repositor, with the patient in the knee-chest position.

into place. A firm cotton tampon is then placed anterior to the cervix, and the patient allowed to assume a recumbent position; as she does so the intestines fall back into their normal position, and with the intra-abdominal pressure aid very materially in keeping the uterus forward.

Adherent Retropositions.—Tubal disease being excluded, as well as other pus-foci in the pelvis, reposition of the adherent organ may be attempted under rare circumstances only. Even here we cannot recommend the procedure. This necessitates divulsion of the adhesions under narcosis or their separation by gradual massage. The patient being placed under ether, the finger is passed into the rectum and the uterus pulled forward. The free hand on the abdomen is depressed deeply along the sacral curve until its fingers touch those in the rectum. The control of the body of uterus is now given into the abdominal hand and the finger withdrawn from the rectum. With nail-brush and 2 per cent. lysol solution an assistant or nurse cleanses the hand. Two fingers are then introduced into the vagina, and the corpus uteri pushed upward and forward while the abdominal hand follows down between the rectum and the fundus. Thus may any adhesions between the two be ruptured. The rest of the maneuvre is completed as before, and a large vaginal tampon of sterilized lamb's wool is introduced. Hemorrhage necessarily follows from rupture of these adhesions, but it is not severe. More or less pain is produced, and some peritonitis may result.

By the gradual or Brandt's method the attempts at replacement are not violent, but made every other day or every third day until the stretching and gentle breaking accomplishes a replacement; each maneuvre should be followed by a snug vaginal tampon of ichthyol-glycerin in order to sustain the gain made.

Neither method is applicable in very fat women, owing to the impossibility of reaching the uterus from above without crowding enough tissue into the pelvis to fill it.

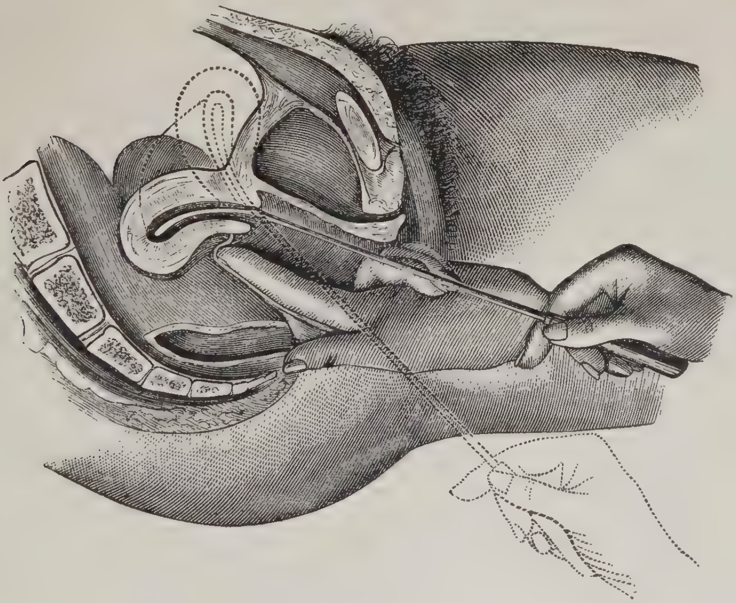
The uterus is best replaced in women who are stout, and in others who are unable to relax the abdominal muscles, by putting them either in the knee-chest or modified dorsal position, and employing combined rectal and abdominal reposition. To prevent the organ slipping from control, it may be necessary to hook the blunt bullet forceps in the cervix. The patient is put on an undulating frame and raised to an angle of from thirty to forty degrees.

Working as rapidly as possible, the finger is introduced into the rectum and the corpus pushed over against the symphysis. The hand on the abdomen then engages it there, and the rectal finger pushes the body of the uterus upward and backward toward the sacrum. The next move is to shove the cervix directly forward toward the upper border of the symphysis at the same time that the abdominal hand releases the body. Thus is the uterus forced into its proper position over the bladder.

As a matter of fact, no attempt should ever be made to replace or otherwise interfere with a uterus which is bound in its displaced position by adhesions. It is impossible to determine accurately whether or not there is disease in the uterine appendages in many cases, and irretrievable damage may unwittingly be done in the manipulations. The only safe and intelligent operations for these conditions are intra-abdominal.

Comparatively few retro-displacements exist without some complicating inflammatory trouble, either intra-uterine or intra-abdominal, and the symptoms usually arise from the complications and not from the displacement. It is all the more necessary, therefore, to be on one's guard in selecting proper cases for this treatment.

Fig. 216.

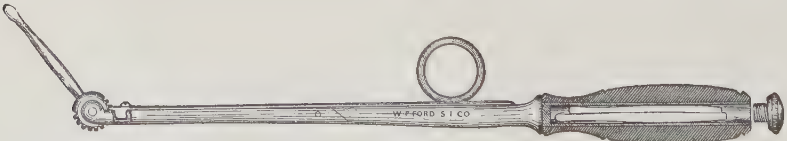


Diagnosis and Reduction of Retroflexion by the Sound.

Replacement with the sound is accomplished by curving the instrument so that it may be introduced, and then causing the instrument to make a half sweep. The whole weight of the organ falls on the point of the sound, which lacerates the endometrium, and has in innumerable cases perforated the uterus. In this maneuvre the organ is not raised as a whole, but the fundus is merely forced into a different relationship to the cervix. If there be any adhesion or other restraint to the raising of the organ, the risk of perforation becomes very great, for there is no escape from whatever force may be used.

The method we advocate and practise in all cases where manipulation and other methods fail—and only when they do fail after repeated trials—is as follows: The vagina should be carefully cleansed, as also should the cervical canal. The patient being on the back, the bladder and bowels empty, the repositor, previously sterilized, is introduced very gently into the vagina and locked; the point is made to enter the cervix and engage there, when the instrument is unlocked. This makes a sound with a joint. The stem portion should be only long enough to reach the internal os. Then by gentle and careful manipulation the intra-uterine portion is coaxed to enter the canal until it has just passed the internal os. The proper length has been selected previously and fitted to the hinge. The finger of one hand is then pushed high up against the back of the fundus, and attempts to lift it are made, at the same time that the repositor is pushed downward in the axis of the vagina, toward the second sacral vertebra. If there be no adhesions, the uterus will become anteverted, and, more, it will be made, cervix and body, to assume the normal position in the pelvis; and this is an important property not attaching to the use of the sound. The instrument is removed, still unlocked, by supporting the cervix with one finger against it and using the symphysis as a fulcrum to slip the staff out of the uterus. If there be intimate adhesions between the fundus and rectum, the efforts to replace the organ will merely drag up the bowel for a short distance, and with the finger in the rectum, the anterior rectal wall will be felt to leave the finger while

FIG. 217.

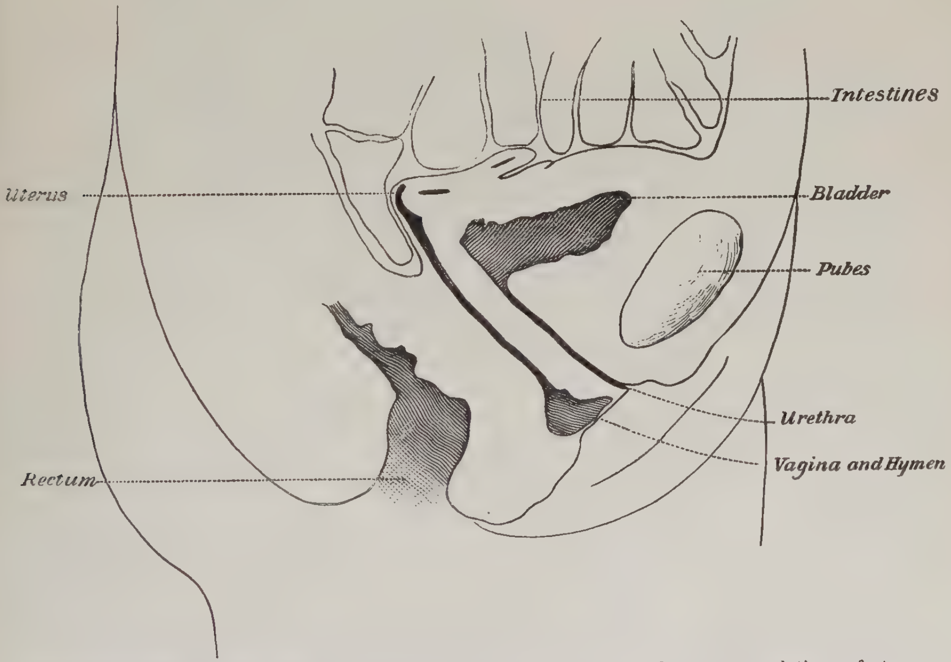


Sims-Pryor Uterine Repositor.

such effort is being made. Or, should the adhesions be of some length, the organ will be replaced to a certain extent only, and then checked by the false bands. We are perfectly aware that there is risk attached to this maneuvre, but with our present method of cleansing the operator, vagina, and instrument this is reduced to a minimum. We do not consider that any more danger attaches to its use than to that of the sound.

If it be desired to support the uterus by tampons after replacing it and removing the repositor, the patient should be in Sims' posture. It will then be much easier to replace the organ, as the introduction of the speculum allows the intestines to gravitate away from the uterus. A glance at Waldeyer's plate demonstrates the manner in which this reposition takes place. Were the uterus retroverted and the bladder entirely empty, elevating it in the axis of the vagina to a point near the sacral promontory would inevitably result in the fundus being dragged forward by the bladder and associated tissues.

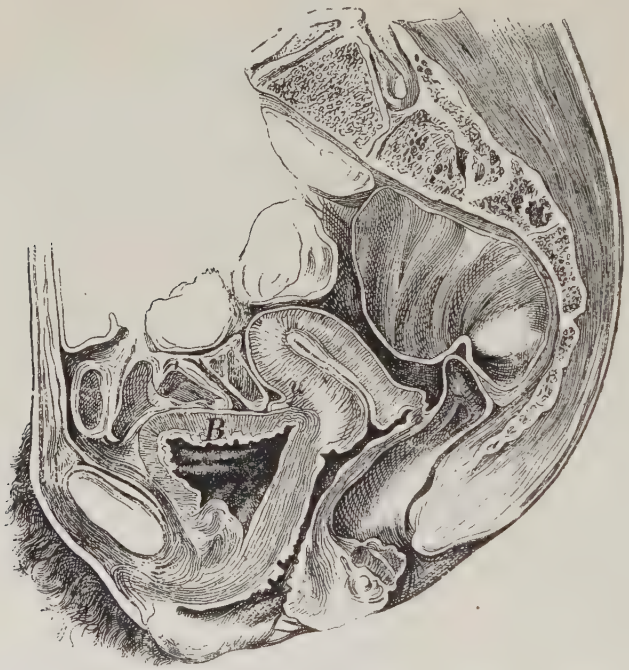
Fig. 218.



Girl Aged Thirteen, Frozen Section, showing direction of intra-abdominal pressure; relations of uterus before puberty; and great strength of pubic segment of pelvic floor.

This could all be accomplished with the finger against the cervix were the finger long enough. The stem is merely for the purpose of affording a hold on the cervix. By observing even the ordinary rules governing all intra-uterine manipulations there is not much danger attending the use of this instrument. It elevates and replaces the uterus merely by following back the path in which the displacement came. It takes advantage of the anatomy, and does not act against it. The weight of the organ is borne on the whole length of the stem in the cervix, and not on one point, as in the use of the sound. With it the exact degree of mobility may be appreciated. But it is *not* to be used where there are pathological conditions in the adnexa, or septic endometritis, and therefore must have a very limited application. Its use as a means of diagnosis of pelvic neoplasms cannot be too strongly condemned. It should be employed only in those cases of free retroposition, where there is no septic focus in the uterus, peritoneum, tubes, or ovaries. This cannot be too strongly insisted upon.

Fig. 219.



Waldeyer's Frozen Section of the Female Pelvis; *u*, uterus; *B*, bladder.

Again, we repeat, this method is to be used only when manipulation fails or is impossible, but is always to be preferred to the reposition by the sound. Both are to be considered only as last resorts.

TREATMENT OF RETROVERSION AND RETROFLEXION.—The object of all treatment must be to have the uterus approach the normal in size and character of its walls, and to place the supporting agents in a healthy condition. Therefore, if the uterus be retroposed and enlarged, it is essential that it be supported in the proper position while such means are employed as will reduce its size. After the uterus has been replaced in such cases it is kept in position by placing in the cul-de-sac a cotton tampon soaked in some depleting agent, as boro-glyceride or ichthyol-glycerin, and then introducing a tampon of lamb's wool. This latter should be put in lengthwise, rolled hard, and turned sideways, so that the ends will rest in the obturator foramina in front of the cervix. When the patient stands the downward motion of the cervix is retarded and intra-abdominal pressure forces the fundus on the bladder. Combined with this, intra-uterine applications of tincture of iodine are to be used. The uterus being elevated, its circulation is improved; being in proper position, drainage is secured; and the astringent intra-uterine and depleting hot-water vaginal injections tend to a reduction in size. It is well to remember that a large percentage of cases of retroposition give rise to no symptoms whatever, and are found out only upon the supervention of some complication.

Ichthyol in 25 per cent. solution in glycerin will cause a cast of the vaginal mucous membrane to come away in some cases. In 10 per cent. it is anodyne, actually relieving local pain; is antiseptic, and adds to the depleting effect of the boro-glyceride.

If there be associated with the retroposition septic endometritis, or if that membrane be much hypertrophied, the curette is indicated, and should be the first step in the treatment.

Having placed the organ in the proper position and condition, if there be tears in the pelvic floor they must be repaired. Nothing tends to the production of the displacement more than costiveness and straining at stool while the woman is still puerperal. Therefore in all cases where the perineum is torn it is better to give a softening enema each day, rather than allow her to strain at stool and occasion a rectocele. Certain cases are symptomatically relieved upon the establishment of thorough drainage, and commonly the attendant endometritis is cured.

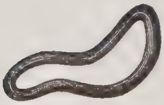
Artificial supports, as pessaries, are contraindicated until the uterus returns into a healthy condition, and all lacerations conducing to displacement are repaired. When that is done, we will find in most cases that pessaries are not needed. The tampon acts so much better in the majority of cases where any such support is called for that the pessary is falling more and more into disuse. The tampon has none of the dangers attendant upon the use of the pessary, and is even more effective.

Retroversion without enlargement, such as we find in the unmarried, is exceedingly difficult to treat. Here one of three things must be done: either fit a pessary, or perform Alexander's operation or hysterorrhaphy.

If it is decided to *fit a pessary*, this should be done only after the uterus is replaced. It is presumed that the integrity of the pelvic floor has been made or is perfect. Therefore the apparent vaginal space while patients are on the back is not the actual when they are standing. So it is that a pessary which seems to be loose while the patient lies down becomes too tight as soon as she assumes the upright position, because of the contraction of the pelvic muscles to support the organs against the intra-abdominal pressure. While the pessary is in situ, the finger should pass all around it with ease. Pessaries act, not by supporting the fundus, but by pushing the cervix up away from the symphysis and pelvic floor, thereby enabling the bladder and the weight of the intestines to drag forward and retain the fundus. It would be unfortunate could a pessary be applied so that it extended up into the cul-de-sac higher than the internal os: ulceration of the vagina would be inevitable. Fortunately, unless the pessary be excessively long, this is impossible of accomplishment.

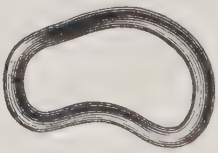
The soft rubber ring, or the Smith-Hodge pessary of hard rubber, are preferable to all others. The Smith-Hodge pessary may be softened and bent into any shape by immersion in boiling water.

Fig. 220.



Smith-Hodge Pessary.

Fig. 221.



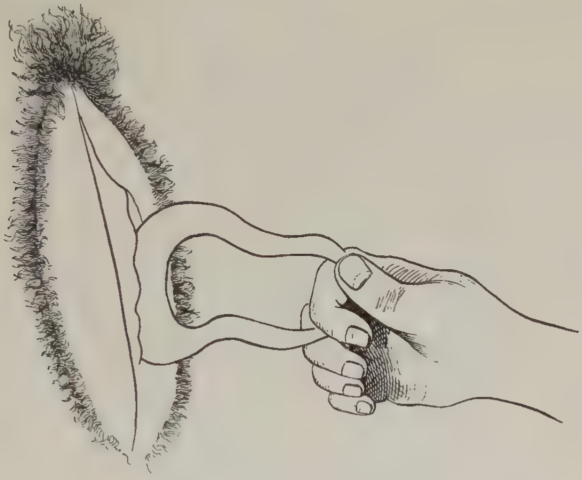
Smith-Hodge Pessary.

Fig. 222.

Solid Rubber Ring Pessary.

If the pessary produces the least pain, it should be removed by the patient at once. And it is positively contraindicated where there is any disease of the adnexa, septic endometritis, urethritis, vaginitis, lacerated perineum, cystitis, adhesions, uterine hypertrophy, and whenever the uterus bends back over the instrument. Not often, then, can pessaries be employed with advantage.

FIG. 223.

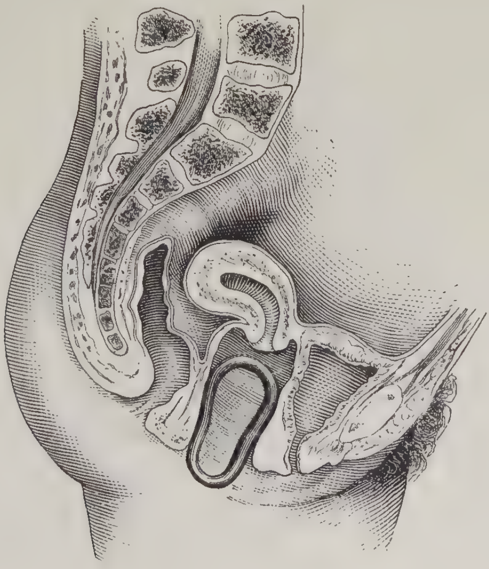


Introduction of Pessary, first stage.

Pessaries should be introduced as follows:

The patient is placed on the back and the uterus replaced. It is essential that the bladder and bowel be empty. The cervix is held up by one finger in the vagina which also depresses the per-

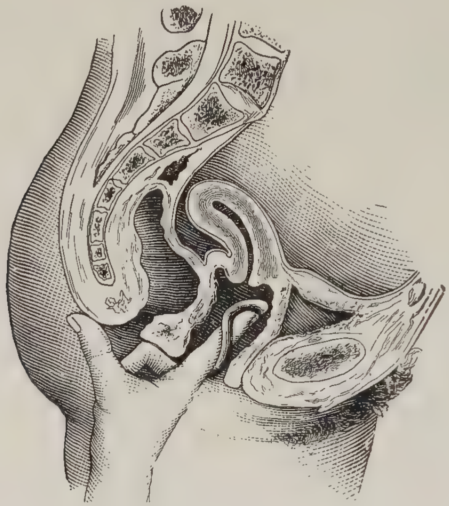
FIG. 224.



Introduction of Pessary, second stage.

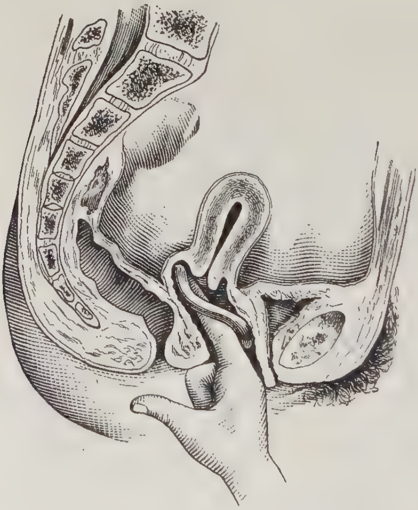
ineum. The index finger of the other hand holds the well-greased pessary, the thumb and middle finger steadying it. The broad end of the pessary is introduced with one side under the pubes and obliquely, so as not to press upon the urethra. As the advancing bar of the pessary passes the vulva the hand holding it is carried high in front of the pubes, so that the pessary may be inserted in

FIG. 225.



Introduction of Pessary, third stage.

FIG. 226.



Introduction of Pessary, fourth stage.

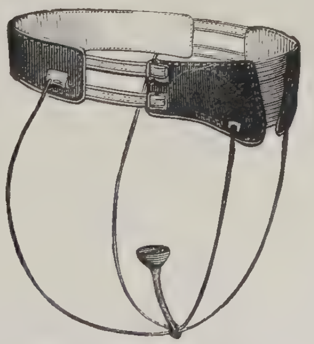
the curve of the pelvic outlet. When it has entered the vagina so as to reach the cervix, the supporting finger is removed and placed against the bow of the pessary, thus guiding it into place behind the cervix. The point of the pessary should not press upon the neck of the bladder or the urethra, but it should be curved downward, so as to take support from the converging pubic rami, thus leaving a space between the arms of the point for the urethra. Again, the base should not be so curved as to press against the ischial rami below. A fairly good test is to pass the finger all around the pessary while the woman is on her back. If that may be done, when she stands and the muscles of the floor of the pelvis contract, the pessary will be snug enough.

Pessaries should not cause the least pain, and patients should not know that they are wearing them except by the relief of the symptoms. Those pessaries having rings into which the cervix fits are objectionable, in that the cervix settles down into the ring so snugly as to obstruct the egress to its secretions.

Stem pessaries with a bow attachment are dangerous affairs, even more so than stems alone.

Pessaries which fasten to belts outside the body are not to be used, except in cases of complete prolapse where the patient refuses all surgical treatment. Under these circumstances they are often of great value.

FIG. 227.



Pessary for Complete Prolapse.

Even in cases temporarily benefited by their use the questions must arise: How long can the patient wear one? Do they ever cure, or are they not makeshifts? In cases in which they appear of use, are there not better methods? It is far better for the patient to go twice a week to the physician for the introduction of a supporting tampon of sterilized wool than to wear a pessary, even under observation.

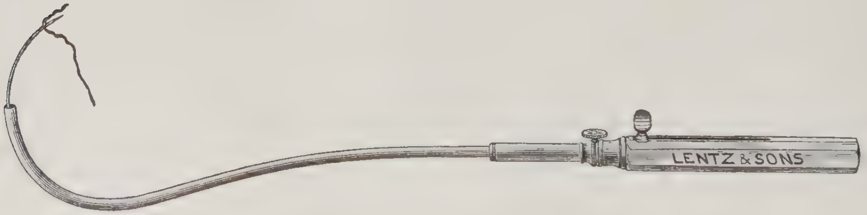
Granted that the uterus has been gotten into a normal condition and all lacerations of the pelvic floor are properly repaired, it is occasionally necessary to use pessaries, but only under the physician's eye. Furthermore, every change in the soft parts of the pelvis produced by pregnancy and labor can be corrected. In cases of retroversion not due to labor, cases occurring in the unmarried, pessaries are of but little use, because they cannot support the uterus above the symphysis, owing to the short vagina, and to hold them anteverted in the pelvic cavity requires a force sufficient to overcome the entire intra-abdominal pressure.

Patients who use pessaries should take daily cleansing douches, and have the supporter removed once a month, cleansed, and allowed to remain out for twenty-four hours before being replaced.

Alexander's operation which is at times used as a means of cure in retrodisplacements undoubtedly is of some benefit, and has a certain field of applicability. But it is a question whether that operation alone could afford much relief. It is usually preceded and followed by measures which ensure its success, and which possibly might have succeeded without the Alexander operation. Again, the operation has a small rate of mortality and a too high rate of failure. It occupies a position between plastic work, which has failed in its purpose, and cœliotomy.

Schücking's operation may be mentioned merely to condemn it. It consists in introducing a hollow sound into the uterus by which the organ is replaced. Then a needle is forced through this instrument, so as to penetrate the anterior uterine wall and appear at the anterior vaginal fornix in front of the cervix. It is threaded and the thread drawn through the uterus. This ligature is tied. It is a blind piece of work, and the bladder is often wounded.

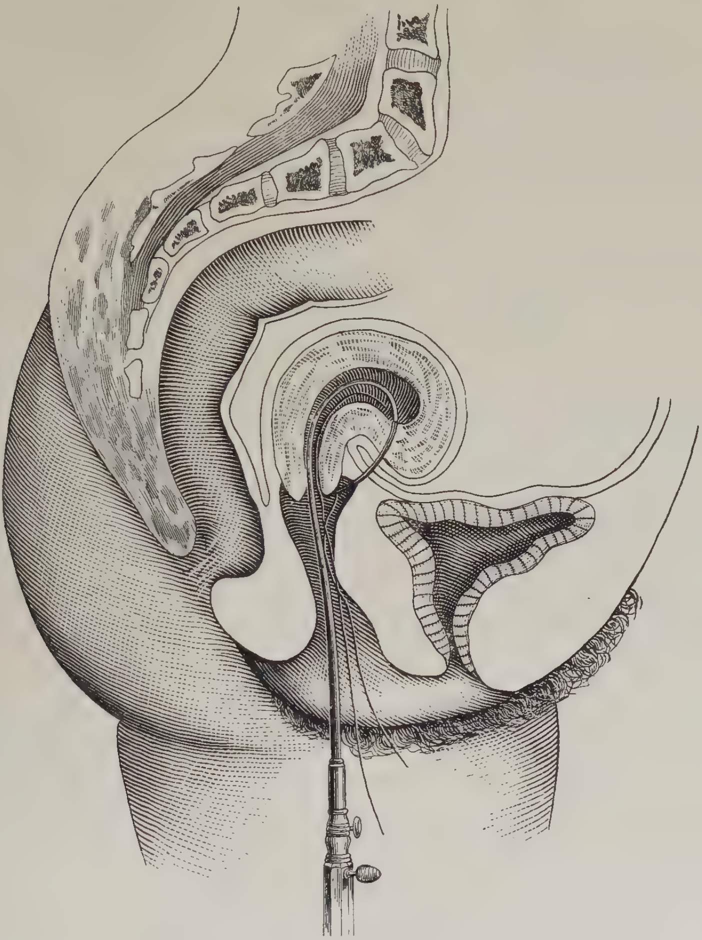
Fig. 228.



Needle for the Performance of Schücking's Operation.

The operation of shortening the round ligaments within the abdominal cavity, by doubling them upon themselves or stitching them to the anterior surface of the uterus, is likewise to be condemned as inefficient.

FIG. 229.



Schücking's Operation for Retrodisplaced Uterus.

Where a retroposition persists after every apparent complication has been corrected, the best operation to perform is hysterorrhaphy.

If an operator can perform hysterorrhaphy with little or no risk to his patient, he will advocate it for intractable retropositions. Should he lose 25 per cent. of his cœliotomies, he will advocate pessaries. It is merely a matter of "point of view."

The endometritis common in these cases must not be overlooked, as it is the most important factor, next to lacerations of the pelvic floor, in the causation of retropositions. Every appreciable lesion being corrected, and after vaginal support has been faithfully tried, Alexander's operation may be indicated. But in all cases where there are adhesions, tubal or ovarian disease, or other intra-abdominal complications, hysterorrhaphy is to be preferred. With these limitations and conditions for each procedure, the gynecic surgeon will perform more hysterorrhaphies than Alexander operations, for the field of usefulness of the latter is very narrow.

With an entirely wrong idea of these displacements and the manner in which they are produced, operators have devised various ingenious but useless methods for their relief. Whatever operation be selected for repair of the perineum must elevate the rectocele, not pull it down. The posterior vaginal wall must be relaxed, so that the uterus may rise.

Women with retropositions conceive very readily, for the simple reason that having acquired, not congenital, displacements, the uterine muscle and endometrium, though often inflamed, have not undergone pronounced structural changes. They also abort very easily.

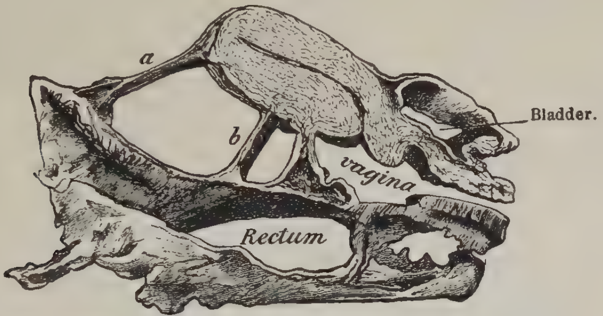
Retroversions with adhesions demand separate mention. Brandt's method shows that the retroposed organ is adherent to the rectum. Careful examination has demonstrated the absence of septic endometritis, and presumably no disease of the adnexa. The retroposed uterus has simply become adherent to the rectum. There are three methods of forcibly replacing the organ. Narcosis and an amount of bimanual manipulations, even to the extent of dilatation of the uterus so as to introduce the finger, has been recommended. After all this, ice-bags to the belly and confinement to bed are advised.

The late Marion Sims replaced the uterus under ether by using the repositor to steady the organ and push it up, and placing one hand above on the abdomen, stripping the bowel from the posterior surface of the uterus.

These two methods necessitate that the adhesions shall be very easily ruptured; that there shall not be the least disease of the tubes—not even occlusion; that the tubes, also, shall not be adherent to the pelvic floor; that there shall not be septic endometritis; that there shall not be even the most minute pus-focus in the adnexa. If any one deems he has diagnostic skill sufficient to determine all this, he may choose one of these methods of replacement. The amount of danger lurking in such procedures cannot however be estimated.

Whenever the retroposed uterus is adherent, ventro-fixation of the organ is indicated. Rare, indeed, must be the cases of adherent uterus without some lesion of the adnexa; we have never found such. This being the case, hysterorrhaphy is indicated, inasmuch as by it whatever complication exists can be corrected. In proposing such a measure to a patient it is well to lay before her the small rate of mortality, and she must judge whether her suffering warrants the risk. If this be refused, the ichthyol-glycerin with supporting tampons, together with hot vaginal injections, reduces the suffering and lessens the complications. Women who work and cannot afford to be invalids will view these questions from a standpoint far different from the wealthy, and demand some form of radical treatment.

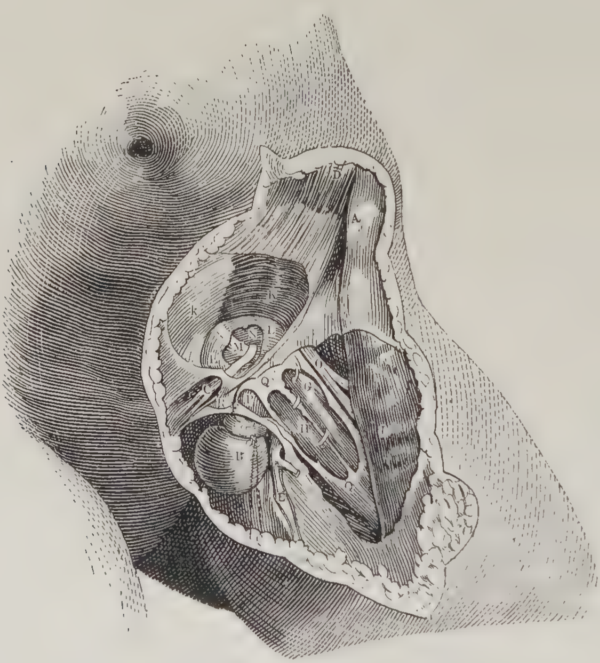
Fig. 230.



Retroversion of Slight Degree: Adhesions (*a* and *b*) passing from the fundus and posterior wall to the rectum.

Alexander's Operation.—The indications for the operation are limited. Granted that the perineum has been repaired and all apparent lesions of labor corrected, yet the organ persists in a retroposed state. There are no adhesions, no endometritis, and no tubal or ovarian disease. In other words, all the pelvic organs seem to be in a healthy condition, but the uterus maintains a retroposition, which still gives rise to symptoms. These, and only these, are the cases for Alexander's operation. They must be exceedingly rare, for if a retroposed uterus is put into a healthy condition, the pelvic floor restored, and the organ supported for some months, its ligaments will regain their tone and require no shortening. The great overlooked cause of persistent retropositions is endometritis associated with metritis. The preparations are as for a cœliotomy. From the pubic spine an incision is made in the direction of the inguinal canal for two inches. The external ring is opened without wounding its pillars, and the thin layer of fascia over the ring severed to the fat beneath, which is pulled out, when by groping with a blunt hook the ligament may be found. If not found here, the canal may be opened to the internal ring if necessary. Having exposed one ligament, it is caught with forceps, the wound protected by a dressing, and the other ligament sought for and secured. The uterus has previously been replaced, and maintained in its proper position by a high vaginal tamponade of iodoform gauze, put in the day before the operation. Replacement on the sound at the time of operation is condemned, and to replace the organ by traction on the ligaments exposes them to the danger of rupture. But immediate replacement may be made bimanually at the time of operation. The ligaments are then drawn out gently until they become tense. If the inguinal canal has been opened, its edges should be carefully closed by catgut, if

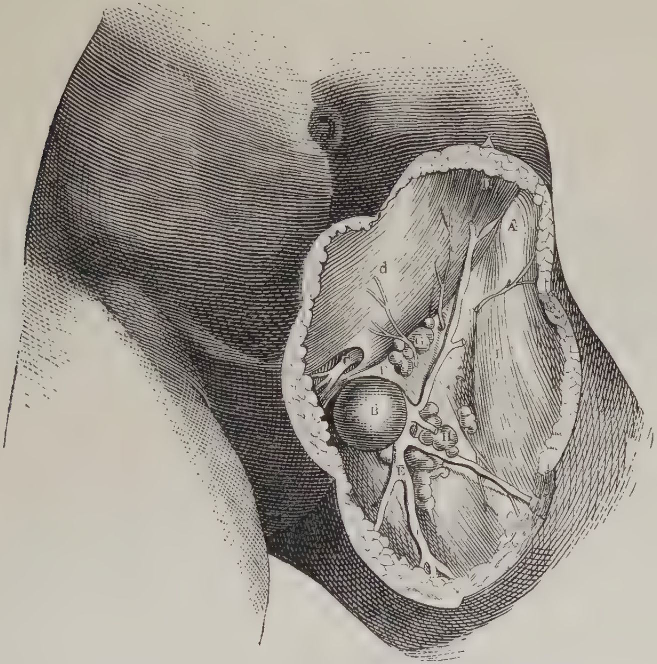
Fig. 231.



The Round Ligament and its Topographical Anatomy: A, anterior superior iliac spine; B, crural hernia; C, *round ligament of the uterus;* D, external oblique muscle; E, saphena vein; F, falciform process of the saphenous opening; G, femoral artery in its sheath; H, femoral vein in its sheath; I, sartorius muscle: K, internal oblique muscle; *k*, conjoined tendon; LL, transversalis fascia; M, epigastric artery; N, peritoneum; O, anterior crural nerve; P, hernia within the crural canal; QQ, femoral sheath; R, Gimbernat's ligament.

the wound is to be closed, or by silkworm-gut sutures if the wound is to be left open. Two to four sutures should penetrate the ligament with the pillars of the ring. The excess of ligament, amounting to from two to three inches, is cut off. If the patient be spare, the sutures may include all the tissues, but if asepsis be imperfect and the woman is fat, it is better to treat the lower portions of the wound by Pryor's method, leaving the fat open to granulate. This should, however, be rarely necessary. In this way the ring is firmly closed, and the ends of the ligaments become buried in a mass of firm fibrous tissue. If the latter be adopted, the suture ends may be cut short and the sutures allowed to become buried. The ligament is recognized by its rounded shape, pink color, and glistening appearance. It is wise not to do too much cutting in the ring, but rather to separate the loose tissues by pinch-forceps, thus avoiding the nerves and vessels. The wounds are dressed with antiseptic gauze. The procedure is the same on both sides. The vaginal tampon is

Fig. 232.

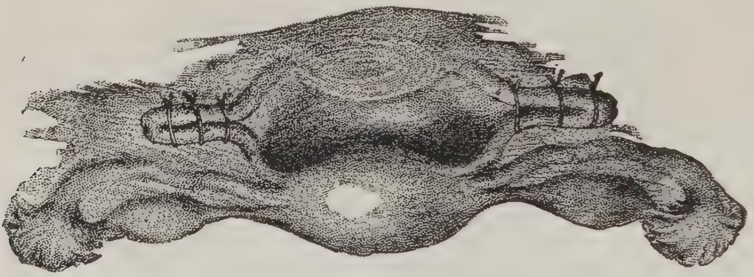


The Round Ligament and its Topographical Anatomy: G, glands in the neighborhood of Poupart's ligament; H, glands in the neighborhood of the saphenous opening; I, sartorius muscle seen through its fascia; *d*, aponeurosis of the external oblique muscle; C, *external portion of the Round Ligament.* The other letters refer to the same parts as seen in the preceding figure.

removed two or three days after the operation, and a small one again applied. This method of support from below is infinitely superior to the use of a pessary, as advised by most authors. There is no danger of inguinal hernia, owing to the escape of intra-abdominal pressure at the perineum. This, together with the gentler avocations of women, prevents this accident after the inguinal canals have been opened.

Wylie or Baer's Operation.—The abdomen is opened with the usual precautions against sepsis. The inner side of the round ligaments are scraped, so as to make their surfaces raw; then, around a fold of each, three silk ligatures are passed, so as to include most of the ligament and fold the raw peritoneal surfaces on each other. Thus the ligaments are shortened, the folds being external.

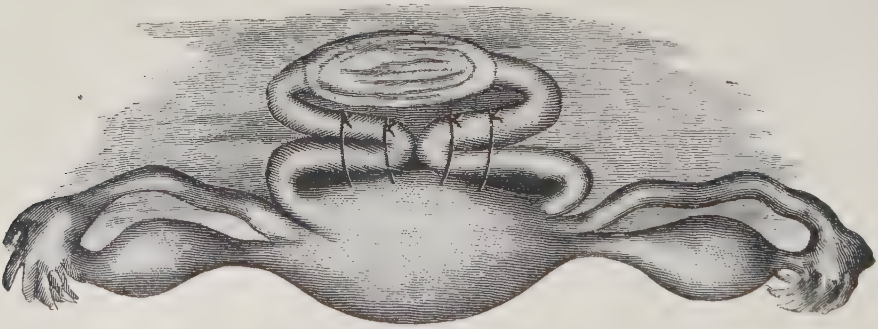
Fig. 233.



Operation Proposed by Wylie and Baer for Retro-displacement of the Uterus.

Dudley's Operation.—The round ligaments in this case are brought in front of the uterus and attached to its surface by silk sutures after the approximated peritoneal surfaces have been denuded. These operations are open to the objection of approximating the cornua of the uterus. Patency of the Fallopian tubes

Fig. 234.



Operation Proposed by Dudley for Uterine Retro-displacement.

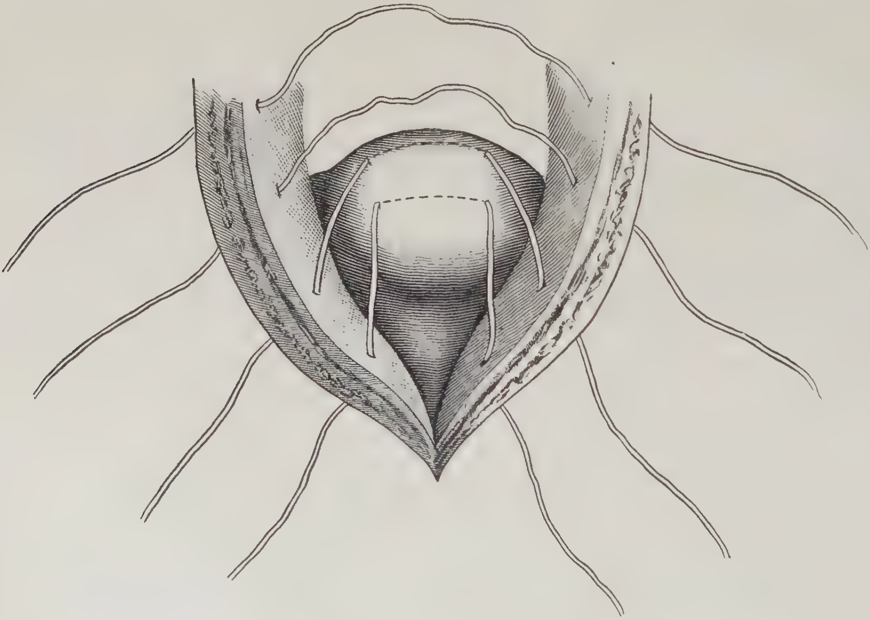
is essential to conception, and they are sharply bent by these procedures, as also by Alexander's operation. Polk has described a case where his operation was followed by occlusion of the tube, and it might easily result from the others. Under any circumstances the results do not justify the procedures.

Hysterorrhaphy.—The precautions mentioned under Cœliotomy are to be taken. Silkworm-gut is the preferable suture material, combining the advantage of silk and silver wire, while free from their drawbacks, the size known as "Salmon-gut" being the best. The abdomen is opened as low down as possible, the incision being small. Trendelenberg's posture is of the greatest help, because the moment the abdomen is opened the pelvis becomes emptied of viscera, thus eliminating the danger of injury to the intestines. When the abdomen is opened, a careful inspection is made of the uterus and adnexa, and the exact condition of the pelvic contents determined. Under the combined guidance of eye and touch existing adhesions are severed. In the majority of cases manipulation with two fingers will suffice to break up the adhesions, the palmar face of the fingers being directed in this maneuvre to the posterior surface of the uterus, and as progress is made the uterus is raised. Old and very firm adhesions may require the assistance of the scissors or scalpel, care being taken that the rectum be not wounded. It is in just these cases, the difficulties of which may not be foretold, that Trendelenberg's posture is of especial benefit, and the incision need not be longer than is required in the horizontal posture. If the operation be attempted in the latter posture, the greatest annoyance is felt from the intestines slipping in between the fingers, which are thereby subjected to unnecessary and even dangerous handling. Hemorrhage due to severing of the adhesions is very slight, for they are not very vascular, being little more than connective-tissue bundles covered by peritoneum. Should the capillary oozing be at all disagreeable and collect in a pool in the cul-de-sac, a wad of antiseptic gauze, preferably iodoform gauze, may be introduced to exercise pressure and catch the blood. This is to be removed just before the sutures are tied. Very seldom will a ligature or stitch be necessary to control the trifling bleeding. Should such be required, it may preferably be of catgut.

The greater the difficulties met with in this operation, the more apparent becomes the benefits of Trendelenberg's posture, each complication contributing a forceful argument in its favor.

The uterus being freed and elevated, the adnexa are carefully inspected, if their exact condition has not already become apparent while releasing the uterus. Should they be the seat of disease which warrants their removal, that is now done. The uterus is lifted up into the wound and into what is deemed the proper relationship to the vagina and the bladder, and a note made of this relative to the incision. The organ being retained in the proper position by sterilized gauze on a holder, the exact site for the fixation of the uterus is determined, and a suture is passed through the entire abdominal wall of one side. The needle is again grasped in the needle-holder and passed deep beneath the uterine serosa from side to side, being entered at the apex of the fundus and penetrating the muscular tissue to the depth of one-eighth of an inch. In this way the suture lies under about a half inch of the serosa transversely. Again the needle is taken and passed through the abdominal layers of the other side, opposite the point of first introduction. A second suture is introduced in a similar manner about a quarter of an inch posterior to the first one, and passing the uterine serosa, as in the first instance. A bayonet-pointed needle is best used, one without a cutting edge. Unless a sharp needle be used or too much tissue

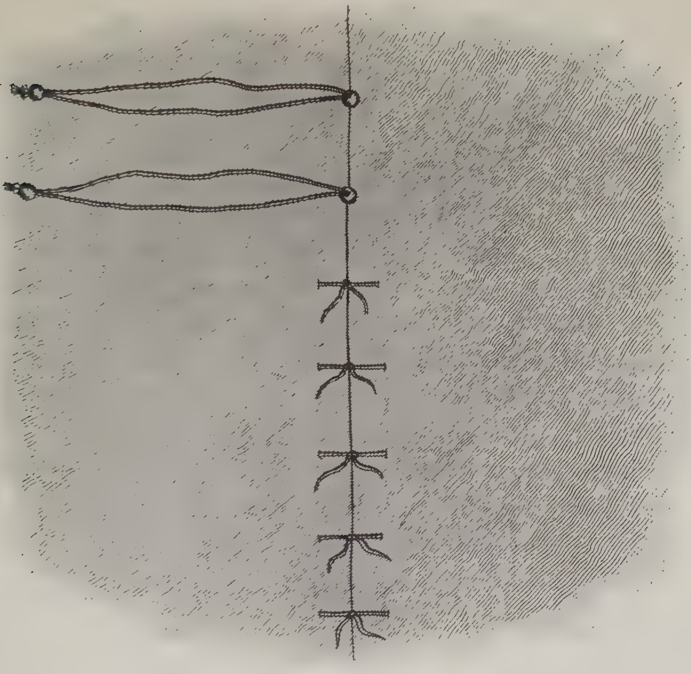
FIG. 235.



Sutures in Position in Hysterorrhaphy.

be taken up by it, the needle-punctures bleed but little. These two sutures are held by catch-forceps, and others introduced to close the rest of the wound. Two sutures only pass through the uterine tissue. The uterine sutures are tied first, after which, if it be thought desirable, the patient may be lowered from Trendelenberg's posture, all danger of including gut between the uterus and parietes having passed when the sutures are tied. While tying the sutures, especially those which pass through the uterus, the peritoneum of the incision should be carefully approximated, and it is wise to leave the uterine sutures quite long for identification. It is advisable to gently scarify that part of the uterine surface which is to come next to the parietal peritoneum, in order to ensure sufficient plastic union between the opposed surfaces, but it is not absolutely necessary. If the uterus be fastened too near the umbilicus, undue dragging will take place on the sutures and increase the tendency which the organ naturally has to break away. And if fastened too far forward, it will embarrass the bladder by making a band across its area of distension from the cul-de-sac to a point above the sym-

FIG. 236.



Stitches in situ in the Abdominal Wall after Hysterorrhaphy. Two lower sutures—the ones which pass into uterine tissue—are shotted.

physis. The sutures should be removed about the eighth day, but those through the uterus may remain three weeks or longer. Just before their removal the uterus should be held up by an iodoform gauze tampon, and vaginal support by gauze or wool should be employed for several weeks longer. Pessaries are inadvisable, for the reason that this operation is seldom done for uncomplicated retropositions. The objections made to the operation are—its possible rate of mortality; the production of a break in the ventral wall, with the possibility of hernia; the formation of a false band around which intestines may become caught; fixation of the uterus in a false position; the induced immobility of the organ; the possibility of failure from the operation, and its effect upon a future pregnancy. None of these objections are pertinent when the hysterorrhaphy is done for retroposition with adhesions or as an operation secondary to another, such as removal of both adnexa, for instance. But they become forcible when we consider the operation as a remedial agent directed to the relief of uncomplicated retropositions of the organ. They may be considered separately. There is no rate of mortality inherent in the operation, and it does not complicate other operative procedures performed at the same time. Still, there is a certain fractional percentage which not even the most precise asepsis can overcome, all of which is due to contingent diseases, "surgical accidents," etc. The possibility of ventral hernia is undoubtedly attendant upon every operation in which the peritoneal cavity is opened. No case, so far as we know, has been reported where intestinal obstruction has been due to the adhesion between the uterus and ventral wall, but the operation is comparatively new, and such may yet occur. Fixation of the organ in a false position is immaterial in view of the relief from symptoms produced thereby. The immobility of the uterus is also another, but not a serious objection. That the operation occasionally fails is undoubtedly true, but if other morbid conditions, especially lesions of the pelvic floor, be properly attended to, failure will be very exceptional. The union obtained is very tender, and, like other adhesions produced from serous surfaces, it is very elastic and prone to stretch. This is eminently so in regard to the uterus fixed in this position, for it not only has its own weight to bear, but also that of the entire pelvic floor when the latter tends to bulge under intra-abdominal pressure. Abortion has occurred in uteri so fixed, and is due to coexisting morbid conditions rather than to the fixation; but it surely does not occur as often as in fixed retroposed uteri. Pregnancy which has progressed to full term has been reported a number of times. Repeated Cæsarean section in the same individual demonstrates the trivial influence of fixation upon the pregnant uterus. The indications, then, for *primary* hysterorrhaphy, are, failure after conscientious and skilled effort to keep up a retroposed uterus, and adherent retropositions.

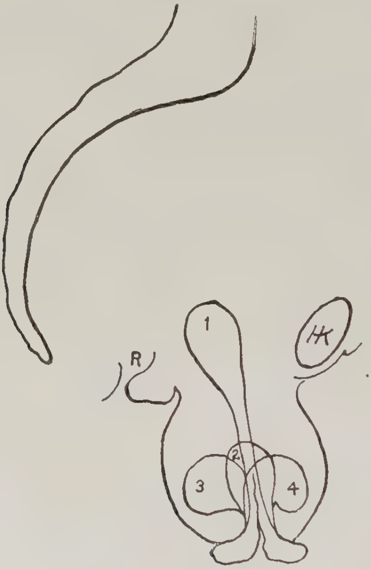
Estimated Value of the Various Procedures for the Relief of Retropositions of the Uterus.—The causes of the displacement should be sought for and corrected. Any conditions resulting from the displacement are then to be cured. This being done, the organ is to be replaced, and attempts to retain it there by means of elastic tampons, as lamb's wool, tried for months; or a pessary may, less frequently, be used for this purpose. The uterus is preferably replaced by the bimanual method, but the repositor may be used as an extreme measure and under all the precautions surrounding an operation. If the retroposed organ be adherent, massage should be tried a number of times. Failing with this, cœliotomy may be done, the adhesions severed, and the uterus fastened up by hysterorrhaphy. Alexander's operation is to be performed only after every resource has been tried and has failed, except hysterorrhaphy, but it must not be forgotten that Alexander's operation is *not* applicable to adherent uteri or where there is any disease of the pelvic peritoneum or adnexa. A very insignificant band of adhesion will suffice to retain the uterus anteposed, when once it has been properly replaced. The intra-abdominal pressure is operative from behind as well as above, and tends to keep the organ in its proper position over the bladder: but when once it falls behind that viscus, the intra-abdominal pressure is exerted only from above. Hence it is that any slight force when properly placed will be sufficient to retain it properly. The great cause of these retropositions is traction from below or pressure from above upon the enlarged uterus, before those frail ligaments—the utero-sacral and round—have involuted after labor.

It is our belief that very many Alexander operations are unnecessarily done upon women whose uteri could retain their normal position, if patience and continuous support from below were used until the round ligaments shrink. These ligaments are but tender cords, and would fail if much strength were required to hold the replaced uterus forward. It has become the habit with some to supplement a cœliotomy by this operation. Hysterorrhaphy or almost any other procedure for retaining the uterus is preferable under these circumstances.

PROLAPSUS.

Descent or prolapse of the uterus may be of any degree, from that of slight displacement, which accompanies a retroversion, to the complete, where the whole organ is below the pelvic outlet. Therefore any explanation of the amount of descent must be descriptive, and the condition cannot be divided into first, second and third degrees.

FIG. 237.



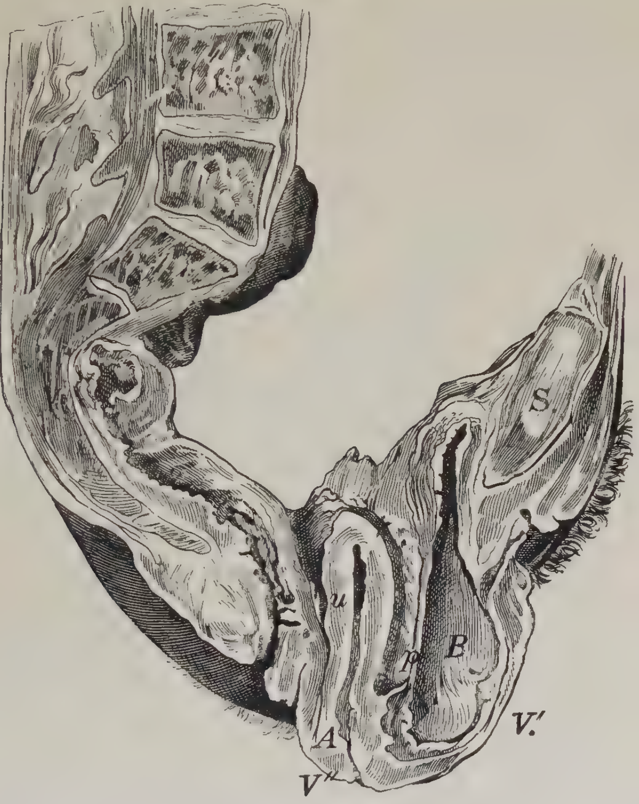
Varieties of Prolapsus.

As a very general rule, the condition occurs in women who have borne children, but it also occurs in nulliparæ. In the two classes the affection is essentially different in etiology, pathology, and treatment.

Complete and partial prolapse comes on gradually in most cases, but sudden efforts or effects, as lifting, being crushed, or falling from a height, may bring it on acutely by rupturing the round, utero-sacral, and broad ligaments.

PATHOLOGY OF COMPLETE PROLAPSE.—The vagina is inverted. Its posterior wall is prevented from further descent by the sphincter ani. The anterior wall is checked in further descent by its attachment to the bladder, the latter doing this through its insertion at the symphysis. The epithelium of the vagina becomes thickened and like cuticle, it may even in old cases have fine hairs. Continuous irritation against the thighs and clothing may produce local losses of tissue in the shape of irregular ulcers. The urethra is also dragged down, and its canal is U-shaped. The uterus occupies the pouch of the inverted vagina, and both before and behind are culs-de-sac lined with peritoneum. Both are below the outlet of the pelvis. Further descent of the uterus is prevented by the anterior and posterior vaginal walls, by the utero-sacral ligaments, but still more by the broad ligaments. The round ligaments play but a small part in supporting the organ.

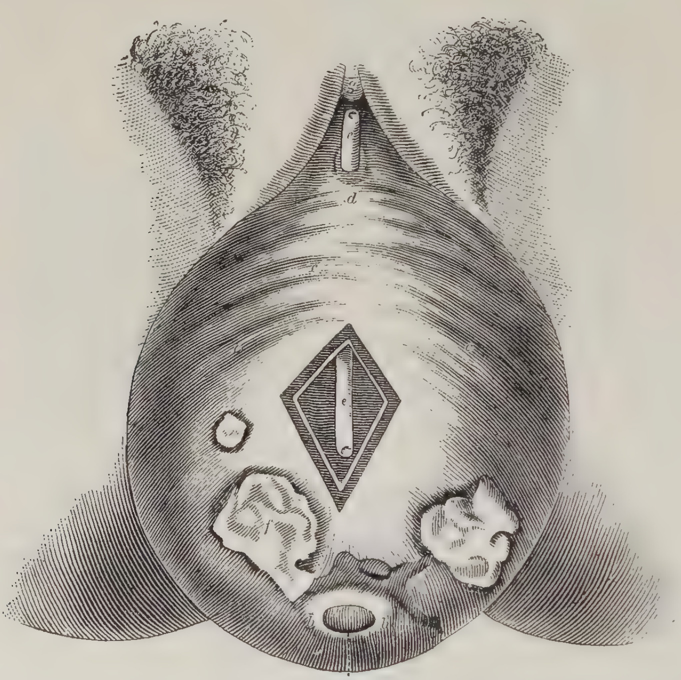
Fig. 238.



Vertical Mesial Section of Prolapsus Uteri: *u*, uterus; *B*, bladder; *V′*, anterior vaginal wall; *V″*, posterior vaginal wall; *S*, pubic bone: *A*, posterior peritoneal pouch; *p*, anterior peritoneal pouch.

The cervix is engorged from stasis, and its vaginal portion, being the lowest point of the tumor, may be ulcerated. According to the integrity of the external os, there may or may not be ectropion of the cervical mucous membrane. The uterine wall and mucosa are in the condition of chronic hypertrophic metritis and endometritis, both being thickened with the production of new connective-tissue elements. There is usually chronic urethritis from retention of the urine in the dilated and prolapsed urethra, and there may be chronic cystitis. The cul-de-sac between uterus and bladder and the utero-rectal pouch may be occupied by intestines; and the ovaries and tubes lie on top of the fundus. Tension on the broad ligaments produces obstruction in the ureters, and inflammatory conditions, even hydronephrosis, may result. In very old cases marked atrophy of the uterus may ensue.

Fig. 239.



Complete Prolapse of the Uterus: *a*, cervical canal; *b*,*b*, superior portion of the vagina, which is now the inferior; *c*,*c*,*c*, mucous surface of anterior wall of the vagina; *d*, urinary meatus; *e*,*e*, probe passed vertically into the former neck of the bladder, to show the total turning inside out of that organ; *f*, ulceration of the vaginal mucous membrane.

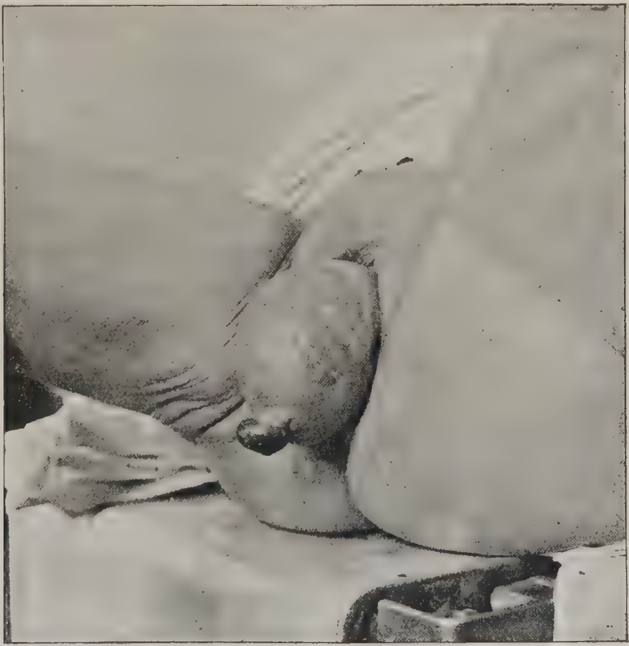
The condition is essentially that of hernia through the pelvic floor. Continuous irritation of the cervix of the prolapsed uterus existing for years may even produce epithelioma. Torsion of the broad ligaments produces varicocele in the pampiniform plexus.

Causes.—The starting-point of all cases of prolapse is a break in the pelvic floor, or relaxation of the uterine ligaments, or increased weight of the uterus. With any one of these factors present an increase in intra-abdominal pressure will produce descent of the uterus. Although the ligaments may for a time return the organ to its normal position after such effort, yet the continuous strain will in time produce the permanent lesion.

Thus it is that we find the condition following labor, or resulting from a neoplasm, or associated with subinvolution and supravaginal hypertrophy of the cervix. The latter condition will be separately described.

Tears in the pelvic floor should warn us against too early resumption of duty after labor. For involution of the uterus alone is not all that is necessary, but the elongated ligaments and generally enlarged parturient canal must also shrink, that the organ may have proper support.

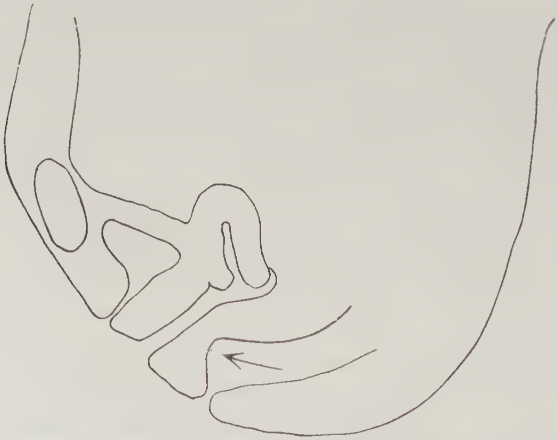
Fig. 240.



Complete Prolapsus Uteri, showing ulcer; also hypertrophy of the mucous membrane; the cervix or os not seen.

Rupture of the perineum more than any one other lesion conduces to prolapse, and in the following way: The parturient woman is naturally inclined to constipation from the very nature of her weakened condition. In attempting to force out the stool by straining the break in the pelvic floor allows of the escape of a good deal of force, and she has to bear down very hard. As she forces the stool down, it does not have the resistance of the perineum, which would naturally direct it backward through the sphincter. The levator ani, which is the muscle opposed in its action to the sphincter ani, and which dilates the latter, being torn, the sphincter cannot dilate normally, but rather closes more tightly. The stool therefore meets this muscle contracted, and, the pressure still continuing, the contents of the bowel bulge out the rectum into the lumen of the vagina, thereby producing a rectocele. In doing this the posterior vaginal wall is drawn down, and it, in turn, pulls on the cervix. In front of the uterus is the thick-walled bladder, preventing its forward movement: therefore it is pulled backward. This traction, together with the steadily-increasing intra-abdominal pressure which the woman keeps up to force out the feces, produces both retroversion and descent. The bowel is emptied, the pressure subsides, and the elasticity of the tissues draws up the displaced organs. Frequent repetitions of this, together with other acts of her life which increase this intra-abdominal pressure, gradually bring about the condition we describe as prolapse. The rectocele is the first pouch of tissue to appear, as a rule. Following upon this rectocele, the uterus having descended somewhat, comes the anterior vaginal wall, producing a cystocele. In this anterior pouch is contained more or less of the bladder. Cystocele occasionally occurs before the recto-

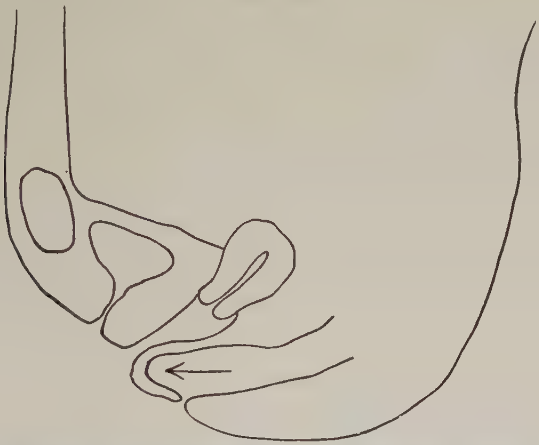
Fig. 241.



The arrow shows the direction of force in the case of a normal perineum when straining at stool. The thick perineum resists, and the fecal matter is consequently forced in the line of the anus and a normal passage secured.

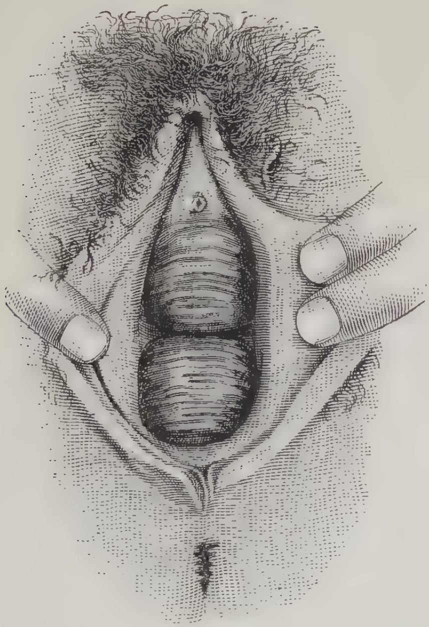
cele, but when it does so it is the result of tears of the anterior wall during delivery. So great has become the desire in forceps and other difficult deliveries to avoid wounding the perineum that the tissues just beneath the symphysis are subjected to much dragging force, resulting in tears to one or the other side of the urethra.

Fig. 242.



The perineum being ruptured no longer resists the force of straining at stool, but is pushed by the advancing fecal matter until it begins to protrude from the vulval orifice. The result is constipation and progressive formation of a rectocele.

Fig. 243.



Cystocele and Rectocele.

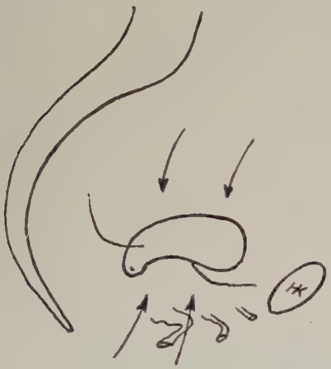
The urethra may even be loosed from its attachments to the symphysis. It is in this way that so great a laxity of attachment of the anterior vaginal wall to the bladder and symphysis is produced as to cause the appearance of cystocele before rectocele ensues. From what has been said the importance of easy evacuation of the bowels by enemata without straining, whenever the perineum is torn, must be apparent. When the axis of the uterus has become coincident with that of the vagina the intra-abdominal pressure bears directly upon the uterus continuously, in a direction which tends to force it out. It must not be forgotten that in its normal position over the bladder, the intra-abdominal pressure is behind the uterus as well as above it, and tends to force it forward. In other words, it supports the organ.

When the cystocele has become at all marked, dysuria is present, and considerable effort must be employed to empty the bladder. Thus another cause for increasing the cystocele is generated. Complete evacuation of the bladder becomes impossible; a little urine is retained and decomposes; an irritable and inflamed condition ensues at the neck of the bladder, followed by ardor urinæ. Thus it is that, when once the prolapse is accompanied by cystocele and rectocele, these conditions become causes for such efforts to empty the bowel and bladder as to still further add to the descent.

The mechanism of the pelvic floor is very simple and easily understood. The practical difference in the pelvic floor between the male and female is the additional break in the latter by the vaginal canal. Nature has guarded this very well by surrounding the whole lower third of the vagina with the levator ani muscle. In its action this muscle, when contracting, *closes* the vagina, lifts the perineum, and pulls apart the fibres of the sphincter ani if the latter be relaxed. The combined action of both muscles is to close the pelvic outlet entirely. Whenever a nulliparous woman tightens her belly and diaphragm, the pelvic muscles contract involuntarily, as in the various movements of the body. When such a woman defecates, the sphincter relaxes, the levator contracts and closes the vaginal cleft, while the rectal is open, thus preventing any marked descent of the uterus. There is a very sufficient correlation between the actions of the two muscles. There are other supplementary but unimportant perineal muscles. The levator ani is covered by a sheet of the pelvic fascia, known as the obturator fascia, which gives it great strength.

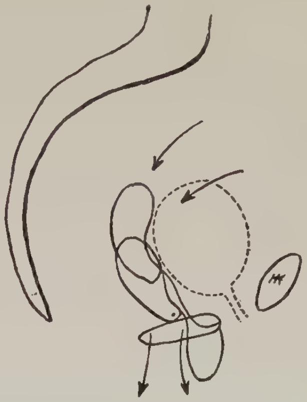
When the fibres of this fascia and muscle are separated, as in laceration of the perineum, their ends retract gradually toward the ischial rami of either side, producing the "angles" or "sulci" spoken of in articles on perineorrhaphy. The older the case the more marked is this retraction. In recent tears it cannot be observed. As the rectocele comes down it pushes out between these separated fibres.

FIG. 244.



Showing effect of intra-abdominal pressure on uterus in anteflexion with intact pelvic floor.

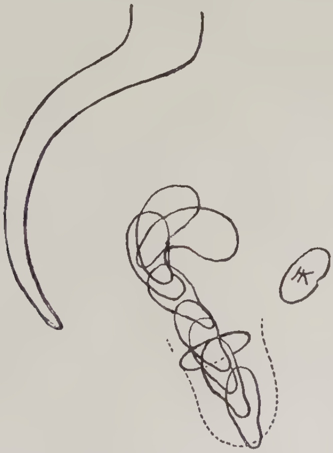
FIG. 245.



Pelvic Floor broken down, Uterus in retroflexion. The intra-abdominal pressure now increases the displacement and ends finally in prolapsus.

A woman with ruptured perineum on defecating relaxes the sphincter, but the levator fibres are torn asunder, and their dilating action upon the sphincter is gone. She has to strain, and as

FIG. 246.



Illustrating the Formation of a Complete Prolapsus, she does so the vagina can no longer be closed by the levator, but the rent allows the intra-abdominal pressure to force the posterior vaginal wall out of the vulval orifice, producing a rectocele. In this way, and this only, is prolapsus produced. The condition is rightly described as a hernia through the pelvic floor.

The first step in prolapsus is a retroposition of the organ. As this increases rectocele supervenes, and in a short time cystocele. When the uterus has descended to the vulva, it loses its retroposed position through its attachment to the bladder, becomes more erect, and is pulled toward the symphysis. On escaping from the body it occupies a position in the centre of the sac. After a certain amount of descent has taken place retarded venous circulation causes the organ to enlarge, and still more contributes to prolapse.

Symptoms.—In acute prolapse there are the symptoms of great shock, signs of internal hemorrhage perhaps, and severe pelvic pain. This condition is rarely seen. Examination will readily demonstrate the lesion.

The uterus is found at or outside the vulva, covered with the anterior or posterior wall of the vagina, according as it was anteverted or retroverted before the accident. The parts are livid from venous stasis, due to pressure on the thin-walled veins in the tense broad ligaments. The patient is usually unable to urinate, owing to distortion of the urethral canal and pressure upon it by the displaced organ. The bearing-down pain amounts to agony.

In chronic prolapse, coming on gradually, the first symptoms are those of backache, bearing-down or tenesmus, shooting pains from rectum to bladder, costiveness, dysuria, pains radiating down the thighs, and absolute inability to walk. And yet a complete prolapse of many years' standing may produce no effect upon the woman, she merely complaining of the inconvenience of the mass. There may be symptoms of kidney disease from obstruction in the ureters, and the peritoneum is often involved in cases, rendering replacement impossible. The erosions which occur produce an annoying discharge. The uterine walls are thickened, but the endometrium is not markedly changed. Menstruation seems as often decreased as increased, due in part, probably, to the fact that most cases occur about or after the menopause. Cystitis is not uncommon, due to incomplete evacuation of the bladder. The costiveness, the continual straining at stool, and the use of evacuants produce a proctitis, which may lead to the supposition of the existence of rectal disease only. Objectively, a tumor is found projecting from the vulva and attached to the margins of the pelvic outlet, and more or less pear-shaped, with the base up. At its apex is found the os externum, into which the probe readily enters. As demonstrating the importance of drainage from the uterus, it may be mentioned that these cases, though subjected to much examination at many hands and exposed to all sorts of filth, seldom present the changes of septic endometritis, so perfect is the escape of the discharges.

If gut be in the posterior cul-de-sac, there may be a tympanitic percussion note at the upper border of the tumor behind.

Usually the tumor may readily be reduced *en masse*, with the production of intestinal gurgling, and as readily comes down again. The sound in the urethra follows down the anterior wall of the tumor for a distance. With the sound in the bladder and finger in the rectum the two meet without the interposition of the uterus, and the finger demonstrates that organ in its new position, with the broad ligaments as tense lateral suspensory bands. In using the sound in the uterus it must not be forgotten that cases of pregnancy in the prolapsed uterus are not rare. Even ectopic gestation has occurred with complete prolapse. Occasionally the sound will show the uterus to be in a retroflexed position in the sac. If the bowels have a tendency to inspissate, the patient has great difficulty in defecation, the stool coming down to the rectum and remaining there through lack of expulsive power in the abdomen. Retention of urine in the cystocele produces cystitis and a constant desire to urinate. The urine has an ammoniacal odor in such cases. In long-standing cases incontinence of urine may come on, the bladder remaining partly filled all the time.

Less descent of the organ than the above description pictures, has been by authors divided into two degrees—the first when the cervix is above the vulval orifice, and the second degree when it appears at or engages in the vulva. They class complete prolapse as of the third degree. There is some convenience in this classification, but it is entirely arbitrary. In examining these cases of lesser prolapse, the patient lying on her back, the uterus recedes quite a distance into the pelvis. But by causing her to bear down, she can readily cause the rectocele and cystocele to appear. Neoplasms and ascites may cause descent if the pelvic floor be not intact.

DIAGNOSIS.—Inversion, polypus, and infra-vaginal elongation of the cervix uteri might be mistaken for prolapse. In inversion there is absence of the cervical canal and presence of the two lateral openings of the tubes at the base of the tumor. The protruding mass is encircled at its highest point by the cervix, presenting the same appearance as though the mass were a polypoid tumor protruding from the cervical canal. A finger in the rectum will reveal the fundus uteri absent from its normal position and the cup-shaped depression in the intra-pelvic cervix. A polypus hanging from the cervix or protruding through the os presents the cervical opening *above* the tumor. The fundus uteri will be found in its normal position.

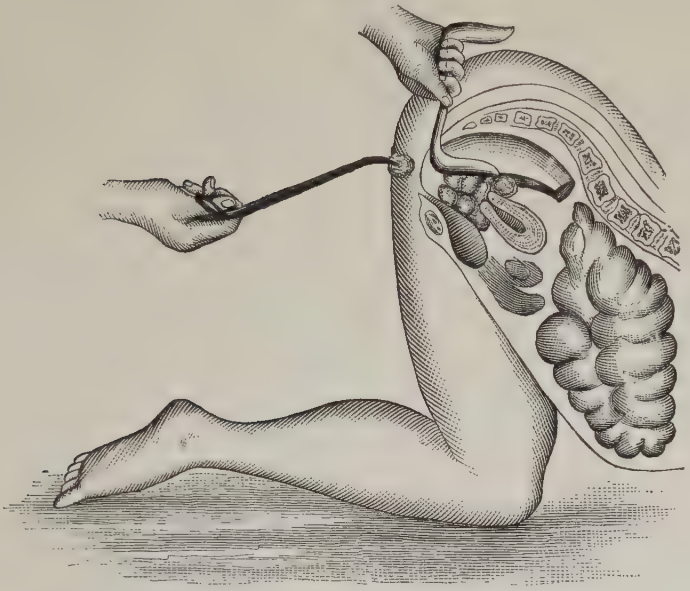
Strangulation of the prolapse may occur when the vulval orifice is small, the organ coming out easily enough, but swelling from stasis, so as to endanger its vitality.

The PROGNOSIS is excellent, both as to relief of the symptoms by palliative treatment and as to the result of operative procedures.

TREATMENT.—It having been ascertained that by taxis the hernia can be reduced, retention in its proper position becomes our object. There are two means by which this may be accomplished. Certain patients will not submit to operation until every other known means has been tried; and in some very feeble and old patients operation is impossible. In employing mechanical supports they should be used so as to produce as little irritation as possible. They must hold up the displaced organs against not only their own weight, but also against the entire intra-abdominal pressure. No support should be used while there are ulcerations. These latter are best treated by applications of iodine, the displacement reduced, the vagina filled with iodoform gauze, and a tight T-bandage applied; or, by reducing the displacement, dusting the vagina with boracic acid, and packing it with borated cotton. Having cured the ulcerations and erosions, choice may be made of a means of support. Hard pessaries must take their *points d'appui* from some bony prominence, as the natural curves of the vagina are lost and the canal is perfectly straight, incapable of retaining any pessary against the force of the intra-abdominal pressure. The only pessary which can be of any use whatever is the cup pessary supported externally by a belt about the waist, and therefore apt to produce pressure-ulcerations. No instrument that has been tried has given such satisfaction and so much relief to patients as

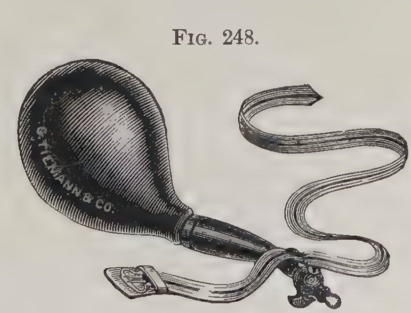
Braun's colpeurynter. It takes its point of support *evenly* from all parts of the pelvic outlet. Before introduction it should be thoroughly cleansed, the vagina washed with boracic-acid solution, and the bag covered by zinc ointment. Being of soft rubber, it has a tendency to excoriate the moist parts unless greased. In some patients the bowel and bladder functions continue with the inflated bag in position. This instrument retains the organs in a higher position than any other. About an ounce of water should be introduced into the colpeurynter, and the rest of the distension made with air. The water is merely to fill the tube when the patient is up and thus prevent the escape of air, with collapse of

Fig. 247.



Tamponade of Vagina for Prolapsed Uteri, in the Knee-chest Position.

Fig. 248.


G. TIEMANN & CO.

Braun's Colpeurynter.

the bag. Or the patient may wear a cup pessary supported by a belt around the waist. This should be removed at night and the vagina douched with boracic acid.

The detail of the treatment of these distressing cases is practically an enumeration of every known pessary and support, the physician in despair putting them aside one by one and hopefully trying another.

Patients may experiment with hollow rubber balls until one is found which will remain in the vagina and keep the uterus within the pelvis. They should be removed each night and cleansed, to be reintroduced in the morning before rising.

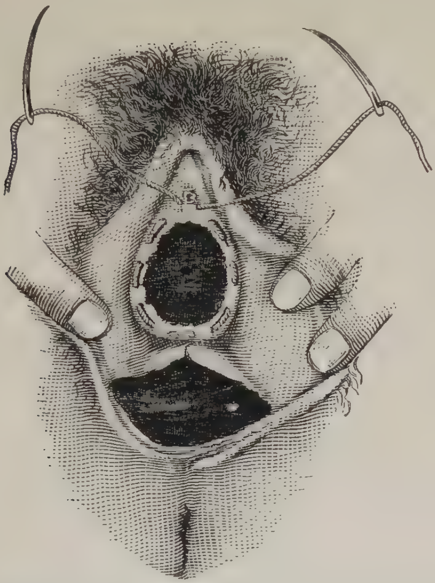
Posture has a marked effect upon the size of the uterus, and before any operation is done the woman should be kept on her back with the head low, the uterus retained within the body, for from ten to fourteen days. During this time also the general functions may be gotten into good condition.

Operative procedures devised and tried are about as numerous as pessaries. The whole question has now narrowed down to a consideration of the best means of uniting the levator ani fibres and obturator fascia of one side to those of the other, of closing the vagina, and holding the uterus upward and forward.

If the descent be due to polypi or other conditions which render the uterus heavy and enlarged, such must be removed by the operative procedure appropriate to each. A curettage is of inestimable value as a derivative, thus contributing to diminution in the size of the organ, whether there be endometritis or not.

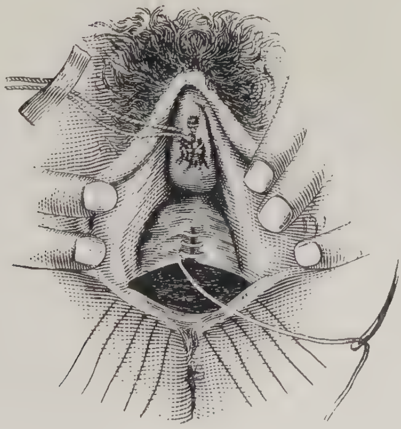
Posteriorly that operation must be applied which pushes up the rectocele, narrows the posterior wall, and best approximates the separate ends of the levator ani muscle and obturator fascia. Operations which drag down the rectocele are to be avoided. The preferable one is Emmet's or a high Hegar's colpo-perineorrhaphy, the upper part of the denudation being close to the cervix. The now fashionable flap-splitting is not thorough enough. Upon the anterior wall Emmet's modification of Sims's anterior elytrorrhaphy is indicated. LeFort's operation closes the vagina, but, inasmuch as the united surfaces are of mucous membrane only, it is not as permanent as the combination mentioned above, by means of which the vagina can be almost entirely obliterated. Most excellent results are obtained in the lesser degrees of prolapse by a combination of Hegar's colpo-perineorrhaphy and Stoltz's operation on the anterior wall. Using this latter operation for this purpose, it should be done as near the cervix as possible. It then fills in the gap left above by the Hegar. If the cervix be hypertrophied, as is usual, it should be amputated, or repaired by Emmet's trachelorrhaphy.

FIG. 249.



Stoltz's Operation for Cystocele and Hegar's Operation for Rectocele.

FIG. 250.



Suture Tied in Stoltz's Operation for Cystocele. Stitches in place ready for Tying in Hegar's Operation for Rectocele.

While in lesser degrees of descent curettage, amputation of the cervix, and repair of the pelvic outlet may so reduce the descent as to symptomatically cure the patients, still in the more pronounced forms of the lesion no permanent benefit can be expected from those procedures only, and they must be supplemented by hysterrorhaphy. Alexander's operation fails here utterly.

Although in exceptional cases all operations may be done at one sitting, yet it is better usually to divide the procedures into two, doing at first the curettage, amputation of the cervix, anterior colporrhaphy, and hysterorrhaphy. The colpo-perineorrhaphy requires a separate sitting for its proper performance, especially as it is necessary to remove the cervical stitches before those in the perineum are placed.

The whole object of these various operative procedures is to reduce the organ in size and at the same time retain it in an elevated position.

Acute prolapse rarely occurs alone, but associated with it are other injuries produced by the same violence. It is to be treated by gently returning the organ and packing the vagina lightly with cotton or gauze. An ice-bag to the suprapubic region will limit pain and bleeding. Symptoms of internal bleeding from ruptured ligaments should be treated by putting the patient in Trendelenberg's posture and by saline transfusion.

In complete chronic prolapse the following operations must be done as a matter of routine: At the first sitting curettage, trachelorrhaphy, Emmet's anterior colporrhaphy, and hysterorrhaphy. In three or four weeks afterward either Hegar's colpo-perineorrhaphy or Emmet's perineorrhaphy should be done. The time intervening between the two operative procedures is occupied with attention to the dressings for the curetted uterus and to removal of the sutures.

Lesser degrees of prolapse, those where the uterus does not escape from the body, require the same operative interference excepting the hysterorrhaphy. All the various plastic operations may be done at one sitting. The uterus is curetted, the cervix repaired, on the posterior wall a high Hegar or Emmet's colpo-perineorrhaphy is done, and on the anterior either an Emmet or a Stoltz anterior colporrhaphy. When doing these combined operations it is better to sew the cervix with catgut.

In old women, who may not expect conception, the preferable procedure is extirpation of the organ instead of the plastic operation. The uterus may be removed per vaginam much more rapidly and with less risk to these patients than if tedious plastic work be done. The danger to old women lies largely in prolonged etherization necessary to plastic work of this extent. This is not the case with the rapid hysterectomy.

SUPRAVAGINAL HYPERTROPHY OF THE CERVIX.

The exact causes of this condition are unknown. It will be remembered that in early infancy the cervix alone exists, there being no corpus. It is possible that some excitant gives the cervix a false start about puberty, and it grows in an entirely disproportionate degree. The condition is to be distinguished from the other forms of cervical hypertrophy already described. It is characterized by an inordinate hypertrophy of that portion of the cervix which is attached to the bladder. So great is this hypertrophy that the increased weight of the uterus causes it to prolapse. The condition is peculiar to the nulliparous or primiparous, and is not found in women who have borne children. With the exception of acute prolapse produced by violence, this is the only form found in nulliparous women. The uterus descends because of its great weight. As it comes down displacement of the upper part of the vagina takes place first, whereas in the prolapse of the multiparous the rectocele and cystocele precede the descent of the uterus. When the prolapse has become complete, so that the entire vagina is turned inside out, yet will a part of the fundus remain within the pelvic cavity. The essential pathological condition is one of hypertrophy of the cervix above its insertion into the vagina. This is not due to inflammatory action, but is rather an excess of normal elements. The changes in the vagina and bladder are here the same as in the other form of prolapse. Owing to the small size of the vulva the tumor is constricted above at first, but in long-standing cases the vulval orifice is fully distended. The base of the tumor is above, the apex below. The sound in the urethra and finger in the rectum show that the fundus lies between. The sound in the uterus will demonstrate its great length. As the patient lies on her back the marked difference in shape between the two kinds of prolapse becomes apparent. Here the pelvic floor is intact, and there is no true rectocele, no redundant vagina. Consequently there is absence of that puffy ending to the mass which is observed in the prolapse of multiparæ. In prolapse due to cervical hypertrophy the vaginal walls leave the cervix at an acute angle. The cervix is not lacerated, but rather conical.

Symptoms.—These are the same as those of the other forms of prolapse. Reduction is not as easy as in true prolapse, owing to the greater amount of uterine tissue relative to the size of the vagina, and complete replacement within the body to the length of the vagina is not usually possible. Straining does not materially increase the displacement, and, conversely, the dorsal decubitus does not lessen it. The general mobility is less than in true prolapse. The physical characteristics are stated above.

Treatment.—This must remain purely of a surgical nature. Palliative measures which afford relief in true prolapse are here useless. The cervix must be removed by high amputation, so that sufficient tissue may be taken away. While the wound is healing the uterus must be kept in the pelvis by vaginal tamponade of gauze. After the union is firm and the sutures are removed the anterior and posterior walls may be narrowed by making on each an oval denudation. The immediate decrease in size obtained does not represent the ultimate decrease, for involution of the organ proceeds some time after the operation of amputation, and the uterus continues for some time to get lighter and smaller.

Infravaginal Elongation of the Cervix Uteri.

Infravaginal elongation of the neck of the uterus occurs as a complication of prolapsed uteri, of lacerations of the cervix, and as a congenital condition. The elongation in the first two varieties is merely apparent, and will not be considered.

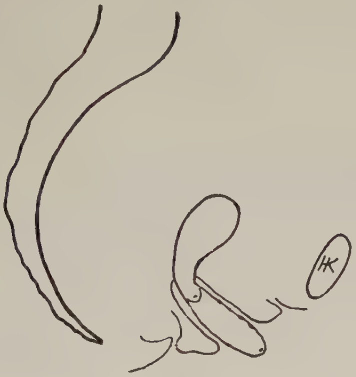
In prolapsus, as the uterus descends, the vaginal vault folds back over the supravaginal portion of the cervix and gives it the appearance of actual elongation. By placing the patient in the knee-chest position the uterus falls back into the pelvic cavity, the uterus and vagina assume their natural relations, and the apparent elongation of the cervix disappears, showing at once the true condition.

In lacerations of the cervix one lip is oftentimes partially absorbed and everted, giving the cervix the appearance of being elongated.

Congenital elongation of the cervix is comparatively rare. The narrow conical cervix of a non-fully-developed uterus is often mistaken for this condition. Such a cervix is really not elongated, but is seemingly so from its peculiarly narrow, tapering shape.

A true elongation of the cervix is always congenital. It may consist of an increase in length from half an inch to a protrusion from the vulvar orifice. Frequently the examining finger comes in contact with it immediately on passing into the vagina.

FIG. 251.



Elongation of Infravaginal Portion of Cervix.

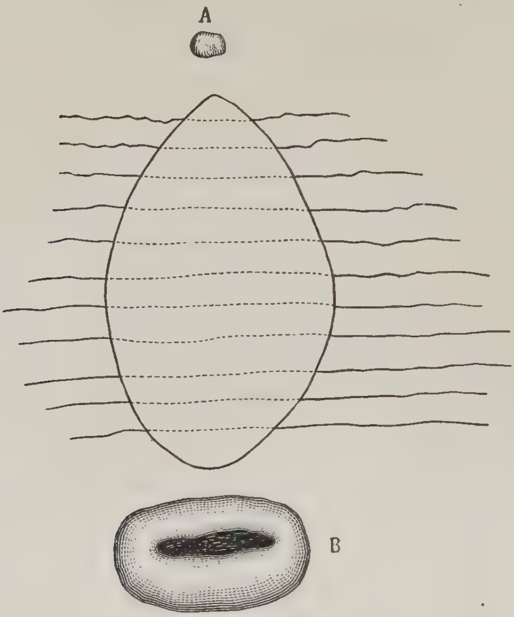
The symptomatology consists wholly in sterility, unless the descent be sufficient for its protrusion into the vulva, when the presence of the tumor will usually be detected. Under these circumstances coition would be materially obstructed. The diagnosis is easy. It may be mistaken for a prolapse, an inversion, or a polypus. A digital examination of the vagina will show the tumor to be continuous with the true cervix, and in no way different from it. Inspection as well as examination by the finger discloses the os. A bimanual examination with the finger in the rectum will reveal the fundus uteri in its normal relation and position and the vaginal mass perfectly continuous with it. These points being ascertained, there can be no excuse for a mistaken conclusion.

The treatment consists in a simple amputation of the cervix at a point about an inch from the vaginal attachments. A description of the operation will be found elsewhere.

PLASTIC OPERATIONS.

Anterior Colporrhaphy (*Emmet*).—A point just posterior to the urethra is marked, and another in front of the cervix. With tenacula the lateral walls of the vagina, midway between cervix and meatus, are brought together. If they can be approached too readily, the tenacula should grasp farther out. The object is to catch up the sides of the anterior wall at points which may be approximated without too much strain. These being determined, they are marked. The four points thus chosen are united by an oval line, the greatest diameter of which is at the middle of the vagina. But this rule is not invariable, and the greatest width may be made where there is the most slack. Denudation is made by cutting with scissors.

Fig. 252.



Emmet's Anterior Colporrhaphy, stitches in situ: A, urethra; B, cervix.

The operation is exceedingly simple and easily performed. The sutures are passed from side to side. They are preferably of silkworm-gut, unless a perineorrhaphy be done at the same sitting, when they must be of good-sized catgut; a double row of sutures being used, the first row buried by the second. This is the preferable operation when it is desired merely to narrow the vagina. It does not shorten it, and therefore does not make traction on the cervix, as does Stoltz's operation. Rarely may it be used alone, for cystocele seldom occurs alone; but it is a valuable adjunct to other procedures adopted for repair of the pelvic floor and reduction in calibre of the vagina.

Anterior Colporrhaphy (Stoltz).—The instruments necessary are a male sound (curved), about No. 24 French; two tenacula; mouse-tooth forceps; bullet forceps; scalpel; scissors and a half-curved Hagedorn needle and needle-holder. The preferable suture material is silkworm-gut. With the tenacula the lateral vaginal walls are picked up and approximated toward the centre of the anterior wall, so as to fix the external points, which may be brought together without exercising too much tension. These two points are then snipped with the scissors. A point in front of the cervix is seized in like manner, and another behind the meatus. These two are then brought toward each other, and the proper degree of tension in this direction likewise determined. They then are marked with scissors. The object is to get four determined points which when approximated to a common centre barely miss touching, so that when the suture is applied these points may be closed in without risk of the suture cutting out. All the mucous membrane embraced within these points is now denuded. This is best done by using the sound in the bladder as a resistant body upon which to cut. The denudation may be made by means of either scalpel and forceps or by means of the scissors. The four points mentioned are united, not by straight lines, but by curved, so that the denuded surface when complete is in the shape almost of a circle. The needle is then threaded and entered to one side of the centre line, behind the meatus. It appears upon the raw surface, and is then introduced on that surface and made to come out on the mucous surface. The same maneuvre is repeated until the entire circumference of the denúdation is surrounded, the needle coming out for the last time across the median line from the point of entry. The suture skips alternately raw and mucous surfaces, each skip being about half an inch in length. The sound is then withdrawn from the bladder, and with its point an assistant inverts the centre of the raw surface toward the bladder, the operator at the same time drawing on the suture. The edges of the denudation are thus drawn toward a common centre, and the cystocele made to disappear into the bladder-cavity. As the urethra is rather stoutly attached to the symphysis, this edge of the denudation moves inward farther than the one near the cervix uteri, so the latter is drawn down toward the urethra. The suture is tied and left long. It really is a tobacco-pouch suture. There is no advantage in accurately uniting the ragged puckered edges. The suture is cut and drawn out in about ten days. The urine should be drawn once in six hours.

As this operation pulls down the cervix, it is contraindicated in all cases where a cystocele exists with an antiposed uterus—*i. e.* in cases where the organ descends and yet retains its proper axis.

But the operation is very useful as part of a combined procedure.

It narrows the anterior wall very effectually, but not more so than Emmet's anterior colporrhaphy, and the latter does not drag the cervix downward. Stoltz's operation is the one of choice for cystocele where at the same sitting it is desirable to do a curettage, possibly a trachelorrhaphy and a perineorrhaphy. Its only advantage over Emmet's anterior colporrhaphy, is that there is but one easily accessible suture to remove, and because it produces a circular cicatrix which is very firm. It is very easily performed by a simple technique.

Colpo-perineorrhaphy (Hegar).—The object of this operation is to unite the separated ends of the levator ani muscle and pelvic fascia, to push the rectocele upward, and to narrow the vagina. It, as much as any other operation, accomplishes this by a simple procedure. Although the surfaces denuded by this method do not resemble the freshly-torn perineum, yet it must not be overlooked that we deal with torn perinea when they have acquired two elements never present in fresh tears—viz. the rectocele and retraction of the divided muscular and fascial edges. We carry out this indication to such an extent that we have extended the line of denudation higher than Hegar does. The divergence between the separated fibres of the levator ani and fascia is very apparent upon parting the labia in old cases, and these lines constitute the two depressed lateral angles. These two angles are near together at the vulval orifice, but diverge as they enter the vagina, until at the upper third they are not apparent at all. Between them is an elevation of greater or less prominence, which pouts out into the vulval orifice upon straining. This is the hernia of the rectum covered by the posterior vaginal wall. There are two parts of Hegar's operation—that which narrows the vagina, and that which approximates the muscular fibres. The former is entirely intravaginal, the latter partly vaginal and partly perineal. The sutures for the former are all intravaginal; those for the latter are vaginal and perineal. No special instruments are needed for the operation. Some operators make the denudation by means of forceps and scalpel, while others insert two fingers into the rectum and cut against them with scissors.

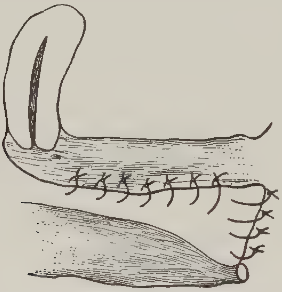
At a point corresponding to the former fourchette, and above the level of the "angles," the mucous membrane of the vulva is caught by forceps and nicked. The same is done on the other side. High up on the posterior vaginal wall, above the rectocele curve, a similar mark is made. This latter is joined to the two former by a light linear touch of the scalpel. With forceps the apex of the triangle is seized and the flap dissected down, care being exercised that the rectum is not entered. It is difficult to remove the entire flap without making buttonholes in it. When the dissection has extended to the base of the triangle, the flap is cut off, thus forming a raw surface as pictured. Denudation with the scissors proceeds in exactly an opposite way, the point of beginning being at the vulva. By this method the vulval margin is caught in forceps, and from its lower circumference a strip of tissue is removed to a point on the opposite side at a level with the first. This maneuvre is repeated until the denudation is complete, each successive strip being shorter than the preceding. Removal by the scissors is impossible unless the fingers be in the rectum to furnish counter-pressure. Consequently, infection by this method is easier than when the scalpel is used. Denudation completed, all bleeding from arterial branches must be checked by ligature with very fine catgut. Unchecked hemorrhage will produce hematomata and interfere with union.

When the tear has extended through the sphincter the procedure is identically the same; only the denudation should extend downward, so as to uncover the edges of the sphincter. When the recto-vaginal wall is torn, again the denudation is made in a triangular form, the tear in the rectum running through the centre of the denudation. In such cases the apex of the denudation must be at least a half inch above the upper margin of the tear, even though it be next the cervix. If this amount of tissue is not taken, the perineal part may close nicely, but leave a recto-vaginal fistula.

In passing the sutures a Hagedorn needle and holder are best. The first sutures passed are those in the vagina. They are of catgut, but may be of silkworm-gut if subjected to much tension. They are entirely buried, and are passed from side to side, one finger in the rectum guiding the needle. The continuous suture is inadvisable, but interrupted sutures should be used. When the suturing has proceeded so far as to bring the last stitch passed through the middle of the rectocele—*i. e.* about three-quarters of an inch from the base of the triangle—the needle is threaded with heavy silkworm-gut. The lowest suture is passed first, the needle entirely buried. The caution is necessary not to enter the needle too far out on the skin, but it should be just at the edge. Four or five of these perineal sutures are passed, the last or uppermost one extending on the rectocele, up to the track of the last catgut suture, but not interlocking with it.

When the fibres of the sphincter ani are torn, the lower margin of the denudation should extend above a quarter of an inch on each side, below the lines of junction of the anal mucous membrane and the cicatricial tissue. In these cases there is always more or less rolling out of the sphincter ends, and these lines may be readily discerned. In such cases the lower two sutures approximate the sphincter fibres.

Fig. 253.



Profile View of Hegar's Operation of Perineorrhaphy.

Where the recto-vaginal septum is torn a continuous suture should be passed from the rectum, from above downward to unite the lacerated borders. When tied the knot of this suture is at the anal margin. All sutures being passed, the next step is to stretch the sphincter ani so as to paralyze it entirely. This is not done where the recto-vaginal wall or sphincter is torn. The suturing brings together fascia and muscle which perhaps for years have been separated and from disease have atrophied. Hence such approximation is accomplished under great tension, which latter pulls against the sphincter ani, tending to separate its fibres. This muscle involuntarily contracts against the attempt, and produces a great deal of pain. In addition to this indication, stretching allows of the more free escape of intestinal gas. After the sutures are tied a stout drain of iodoform gauze is introduced into the vagina and projects from the vulva. The catgut sutures are tied in three knots, the silkworm-gut in two. Both should be cut to leave ends half an inch long. Iodoform is dusted on the perineum, and gauze placed over the sutures and held in place by borated cotton and a T-bandage. The vaginal gauze is removed at the end of forty-eight hours, and a vaginal douche of saturated solution of boracic acid given. Another drain is not introduced unless there be special indications for it, such as bleeding or sepsis. Twice a day the nurse should irrigate the perineal sutures with bichloride solution, 1:4000.

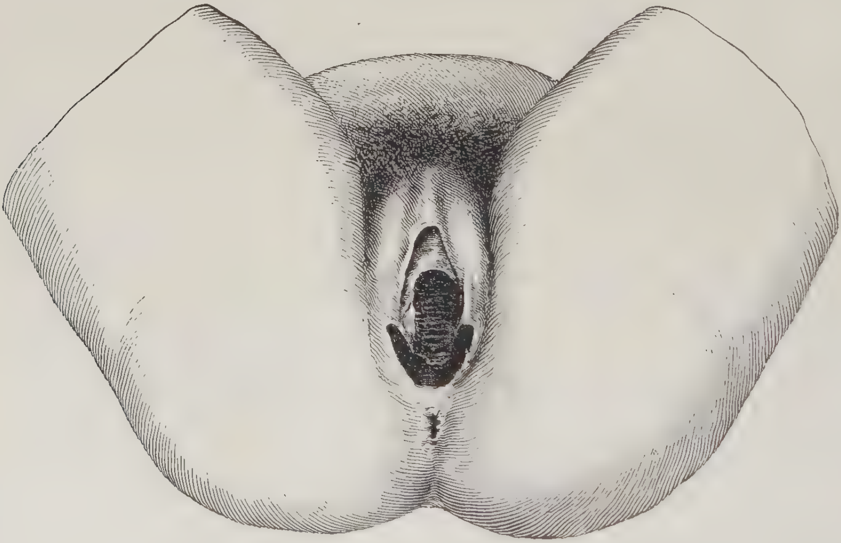
The patient should be given vegetable cathartic pills the second night, so as to operate on the third day. When she has the stool it may be softened by small enemata of saline solution. After this first stool others should be had every second day. The sutures are removed about the tenth day. If there be much tension, they may cut into the flesh. Alternate ones may be removed then on the seventh day. Scrupulous cleanliness is imperatively necessary throughout the whole after-treatment. The diet should consist largely of soups, vegetables, and fruits. Opium is not needed. There is no necessity for confining the legs after the patient has recovered her senses from the narcosis, and she may be allowed to lie on her side. Confinement to bed for at least two weeks is necessary, and longer if the operation be part of the procedure to correct prolapse.

When the recto-vaginal wall has been torn and repaired, the after-treatment is somewhat different. As little disturbance as possible of the pelvic floor is here demanded. Therefore these patients should have received a most careful preparation as regards emptying the entire intestinal tract before the operation. After the operation they should receive liquid food only for three days, with cooked fruits. The bowels may be gently assisted by enema if they tend to move, but if not laxative pills may be given on the third night. In these cases, if the bowels are too fluid, particles are apt to leak into the wound, and if too hard, the stool may separate the united edges of the rectum. Rectal tubes, whether covered by gauze or not, are of no use, but rather harmful where there has been complete laceration.

When the Hegar operation is done as part of a combined procedure—as, for instance, a curettage, trachelorrhaphy, colpo-perineorrhaphy, and anterior colporrhaphy—the uterus is first curetted. Next the cervix is sewed up; then the uterus is again irrigated, and packed with gauze. A wad of gauze is placed over the cervix, and the denudation for the Hegar operation made. This raw surface is covered by iodoform gauze while the anterior colporrhaphy denudation is made. The sutures are passed first on the anterior wall and then on the posterior. The wad of gauze is removed from the vagina, and the sutures of the anterior colporrhaphy and colpoperineorrhaphy tied alternately. It is well in such cases to have a drain of gauze the size of the thumb extending through the length of the vagina, to keep the two lines of denudation apart and to catch discharges.

Flap-splitting Perineorrhaphy.—The objections to this operation are twofold: It in no way narrows the vagina, and it only partially approximates the levator ani fibres. Its field of usefulness is very limited indeed. Practically, it is applicable to those cases in which only the superficial and most exterior fibres of the perineum are torn. That by means of it the separated sphincter fibres can be united is undoubtedly true. But where a tear is so extensive as to produce prolapsus the levator ani also is entirely separated. To unite the sphincter by flap-splitting is but part of the work indicated. In no way possible can this operation narrow the vagina, abolish a rectocele, or bring together the separated fibres of the pelvic fascia. It should be performed only in the case of a patulous vulval orifice without rectocele, in the case of either complete or incomplete laceration of the perineum.

Fig. 254.

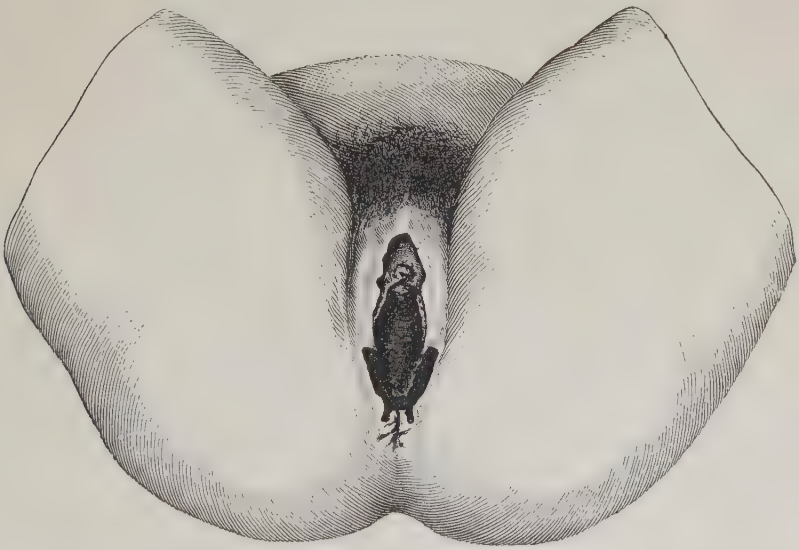


Flap-splitting for Incomplete Laceration of the Perineum; Relaxation of the Vaginal Outlet.

The operation is performed with the patient in the dorsal position. The instruments required are a sharp-pointed pair of scissors bent on the flat, a handled perineum needle, and a tenaculum. Occasionally a pair of hemostatic forceps will be necessary to temporarily control bleeding.

For Incomplete Laceration.—The index finger of the left hand being introduced into the rectum as a guide, the point of one of the blades of the scissors is thrust into the recto-vaginal septum, midway between the vaginal opening and the anus, to the depth of half an inch or more, care being taken that the instrument enters neither the vagina nor rectum. From this point the incision is made, first to one side and then to the other. The line of the incision is carried on each side outward and upward along the boundary-line between the vaginal mucous membrane and the skin of the labium. It is extended up the labium to that point at which it is desired the new vaginal floor shall exist; this point is usually that at which the lower caruncle (remnant of the hymen) exists, which point, in addition, can be located by the existent scar-tissue. The depth of the incisions tapers gradually until they reach the highest point on the labia. When completed the incisions form the elliptical figure U.

Fig. 255.

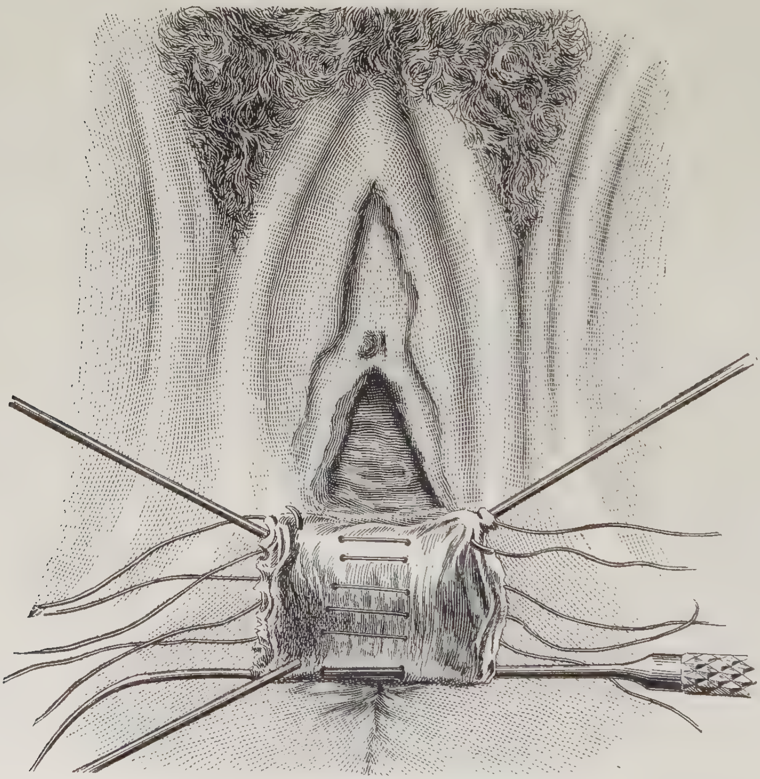


Flap-splitting for Complete Laceration of the Perineum; Laceration through the Sphincter Ani Muscle.

For Complete Laceration.—Where the sphincter ani muscle is involved in the laceration the method of repair is precisely similar, with the addition of two small slits. They are made by cutting down each side of the anus to the ends of the retracted sphincter muscle, beginning the cuts at the curve of the original incision. Their length and depth are variable, depending upon the position of the retracted ends of the sphincter muscle, which must be exposed, so that when they are brought together the two ends may unite. When completed the incisions present the appearance as shown in Fig. 255.

With the sides of the wound well separated the sutures are passed transversely. Beginning at the middle of the opening, the handled needle is made to pierce the skin about one-eighth of an inch from its cut edge, is carried three-quarters of the way to the bottom of the wound, where it is made to emerge, and, being reintroduced at a point directly opposite the point of emergence, is carried under the tissues of the opposite side until it appears on the skin surface at a point directly opposite that at which it was first introduced. The eye of the needle is now threaded with a silkworm-gut suture and the needle withdrawn, dragging with it the end of the suture. Sev-

Fig. 256.



Introduction of Sutures in Flap-splitting Operation.

eral similar sutures are passed above and below this median one. The topmost suture must pass through the vaginal flap as it is held up by a tenaculum; the lower suture, if the laceration be a complete one, must include both ends of the retracted sphincter muscle. The corresponding ends of the suture being now tied, or, better, shotted, the pelvic floor is lifted up toward the pubis by the crowding in below of the gluteal tissues. The result forms a very firm and substantial support to the vaginal outlet, but in no way has any influence on any injury done to the vaginal floor.

Following this line of operations in young or middle-aged women, rarely will it be found necessary to extirpate the uterus. Only where hysterorrhaphy has failed or the parietes are so flabby as to render that procedure useless may hysterectomy be performed.

If hysterectomy be decided upon, it must be followed up by extensive plastic work on the pelvic floor.

Only after every operation for supporting the organ from below has been tried and failed shall the question of its removal be entertained. In women at, near, or past the menopause hysterectomy is to be recommended as more certain of ensuring a cure. If this operation be decided upon, the choice will lie between the vaginal and abdominal methods.

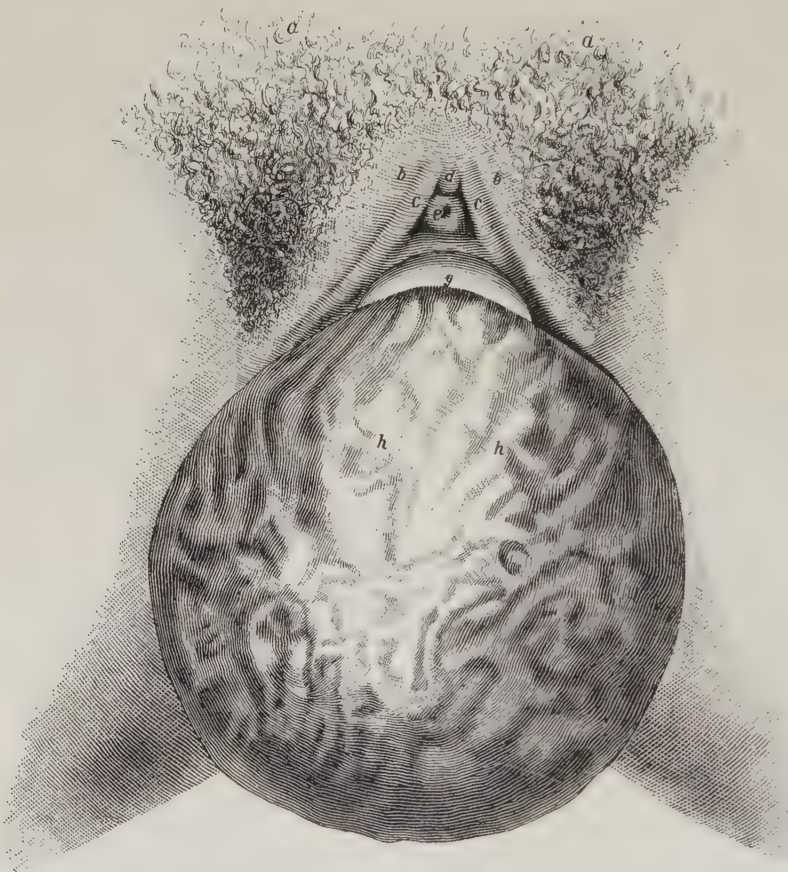
Vaginal hysterectomy is recommended as the preferable operation. It should be performed with ligatures, and the stumps fastened into the vaginal opening, so as to draw the vagina upward during the process of contraction and repair, and give that organ a permanent support from above, which can be obtained in no other way.

INVERSION OF THE UTERUS.

This fortunately rare complaint is most often a complication of labor, and, at the same time, very generally fatal. But cases do live, and, as the condition results also from neoplasms, such as fibroids, they come to gynecologists as cases of chronic inversion. As such they will be described.

That it may occur in the virgin uterus is undoubtedly true, but the vast majority of cases result from childbearing. It is necessary that the cervix be large and patulous, the fundus heavy and soft to enable the uterus to turn inside out, for such is, in reality, the condition in inversion. Continuous severe hemorrhage marks most cases. The patients are anemic, suffer great pain and bearing-down in the uterus, and frequently there is a profuse leucorrheal discharge, often purulent. They are very generally incapacitated for their work, and as time progresses they become more and more disabled by exhaustion. Examination shows a tumor symmetrical, firm, and of reddish color, filling the whole or part of the vagina as the inversion is partial or complete. Occasionally a fibroid polyp of greater or less size is attached to the inverted fundus, and this has probably been the exciting cause of the displacement. At first, in the early stages, the cervix is open and is occupied by a loop of intestine, but later it becomes contracted and merely contains the Fallopian tubes. The condition may also be associated with prolapsus, in which case the tumor may protrude from the vagina, under which circumstances it is not infrequently mistaken for prolapsus uteri. Generally the tumor is retained in the vagina.

Fig. 257.

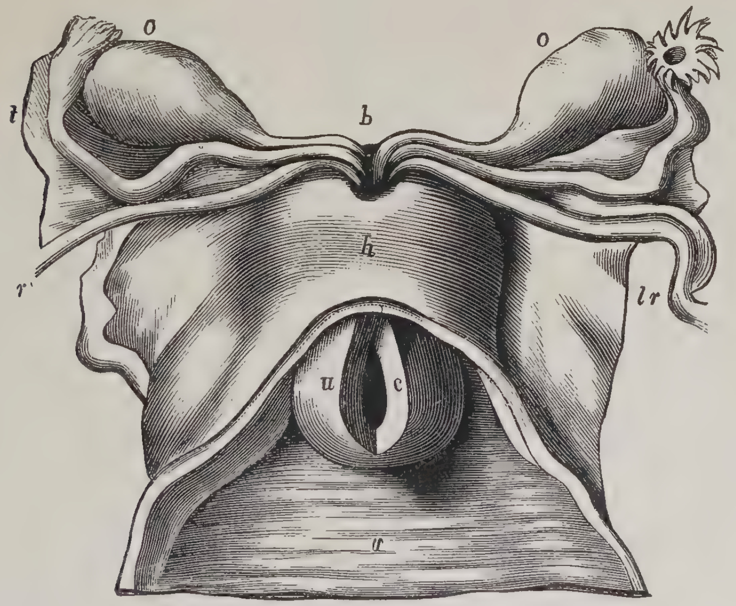


Inversion of the Uterus: *a*, mons veneris: *b*, the larger labia: *c*, *c*, nymphæ: *d*, clitoris: *e*, meatus urinarius; *g*, anterior border of the external os of the uterus; *h*, *h*, the internal surface of the uterus turned outside.

Inversion having taken place, the cervix contracts, and strangulation and gangrene of the uterus may result. Cases have been reported of spontaneous cure by the fundus sloughing away in consequence of the constriction to its circulation caused by the cervix squeezing it tightly; also by the organ returning to its normal condition. Atlee reports an interesting case of this kind, where the inverted uterus was reduced by persistent and long-continued efforts at coition on the part of the husband after all other treatment had failed. The woman became pregnant and was delivered of a healthy child. The uterus had been inverted for years. Cases progress to a fatal issue from shock, due to hemorrhage, and progressive asthenia, sepsis, or peritonitis. The usual cause of death in the chronic cases is exhaustion from the continuous loss of blood.

The DIAGNOSIS must be made by examination, and is occasionally very difficult, although usually the condition is readily determined by a vaginal exploration. The soft, uniformly enlarged mass is felt filling the vagina, the upper end or pedicle of which is constricted by a ring of tissue, through which it is very evident that the mass protrudes. If that condition be made out satisfac-

FIG. 258.



Complete Inversion: *v*, vagina; *u*, *c*, incised uterus, showing the cavity; *b*, border of the inverted portion: the round ligaments, Fallopian tubes, and the ovarian ligaments are drawn in it; *l r*, round ligaments; *t*, Fallopian tubes; *o*, *o*, ovaries; *h*, cervix covered by peritoneum.

torily, the true lesion can hardly be overlooked. Should there be any uncertainty as to the diagnosis, the bladder and rectum should be emptied. Examination combined by means of a sound in the bladder and a finger in the rectum will demonstrate the absence of the body of the uterus from its normal position, and the dimple of the inverted cervix will be felt from above. The tumor itself is firm, smooth, and the surface bleeds easily. The invariable diagnostic signs are the opening of the cervix above, which can be reached by the rectum, even though it may not be felt through the abdominal wall, and the very small openings of the tubes, at the sides of the base of this tumor, together with the constricting band of cervix about the pedicle of the tumor as felt in the vagina.

The PROGNOSIS is unfavorable, on account of the constant loss of blood, it being only a question of time as to how long the patient can stand the drain.

TREATMENT.—Chronic inversion is exceedingly difficult to cure. Gentle, continuous taxis, at the same time using some force, is the preferable method to be first tried. It is made as follows: The hand in the vagina grasps the fundus and exercises firm pressure upon it. The hand above, on the abdomen, attempts to distend the cervix and make counter-pressure, while the fundus is squeezed and pushed up. Many failures should not discourage the surgeon, but the pressure should be gradual and steady, care being taken not to use undue force, as must be the case in all efforts to overcome the contraction of unstriped muscular fibre. Peritonitis and death have been known to result from rough and too prolonged efforts in this direction. If the cervix yields, it yields rather suddenly. The attachments of the vagina to the cervix are of aid to the manipulations, and the tumor can be pushed up so as to render the vagina tense during the maneuvre. The operation is best performed with the woman under the influence of an anesthetic. Repeated failures after conscientious effort compel us to consider continuous elastic pressure, removal of the organ, or, possibly, attempt at replacement by Thomas's method.

Taxis having failed, continuous elastic pressure must be tried. The bladder and bowels being empty, the uterus is pushed up if prolapsed, and a Braun's colpeurynter, previously soaked in a saturated solution of boracic acid for several hours, is introduced.

This is then injected with tepid water until it fills the pelvis very snugly.

The contents of the colpeurynter are to be gradually increased. It should not be left in too long, but once a day should be removed for a few hours, the parts and the colpeurynter cleansed, and the latter reintroduced. Few cases will resist this method of treatment. The object of the treatment is to exercise a continuous pressure, not sufficient, however, to obstruct circulation to too great an extent. During the treatment the patient should be kept in bed; indeed, the pain produced by the colpeurynter is pretty severe, and would of itself confine the woman to bed. Morphia for its relief is indicated, but should not be pushed too far.

The only caution to be made is that the physician should not become too easily discouraged in his attempts to replace by taxis and the colpeurynter.

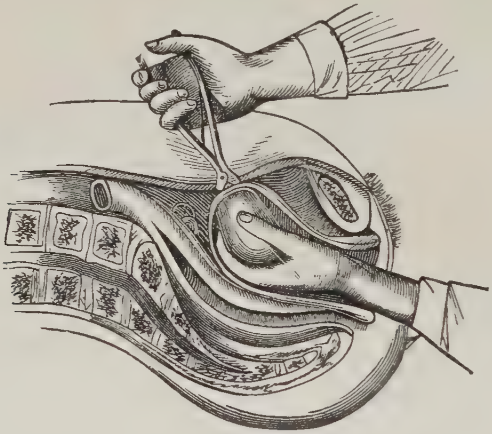
It is now twenty-three years since Thomas advocated opening the abdomen and dilating the cervix, and in that time the mortality from celiotomy has fallen to a very small percentage; therefore when taxis and the colpeurynter have been given repeated tests and have failed, Thomas's operation may be tried, although without much prospect of success. If replacement cannot be made by Thomas's method very promptly, at the same sitting the organ can be removed by abdominal hysterectomy in a few minutes.

Thomas's Operation for Inversion.—Thomas succeeded with one case, and lost his second from infection—something which now may be prevented. A consideration of the technique of the operation and the changes in the uterus give promise that the mortality can be kept below 10 per cent., but the proportion of successes is very slight.

The patient is prepared for both a vaginal operation and a celiotomy. The special instrument required is Thomas's dilator. It might be usefully modified by making the flanges wider, so that at the act of dilating pressure upward may be made, thus contributing to the rolling out of the inversion. The dilating portion need not be so long. A short abdominal incision only is necessary, merely sufficient to ascertain the condition of the intraperitoneal tissues. The abdomen being open, the operator's left hand is introduced into the vagina and the mass pushed up to the incision. The dilator is introduced and the upper part of the constriction dilated at the same time. This is an important observation by Thomas—

that the reduction takes place in a manner exactly the reverse of that in which the inversion occurred. In this way each fraction of the constriction is successively dilated, and the inversion is reduced in stages beginning with the cervix. The caution is necessary to so apply the instrument as not to wound the tubes. Because of the possibility of this it might be better to try the fingers arranged into a cone before using the dilator.

Fig. 259.



Thomas's Operation for Replacement of Inverted Uterus.

Vaginal amputation is at no time justifiable. If conservative methods fail to reduce the deformity, the uterus must be removed in toto. Should the abdomen be opened for a trial with Thomas's operation, and that fails, as has usually been the case, removal of the womb from the abdominal opening is the proper procedure. Should it be decided from the first not to try the Thomas method, but to remove the displaced organ, vaginal hysterectomy is the proper procedure to be adopted.

To recapitulate, gentle but well-directed efforts at taxis are to be first tried, with the patient under an anesthetic. Should this not accomplish the object at a single sitting of an hour, or show very decided signs of ultimate success, continuous elastic pressure by means of the colpeurynter or Aveling's repositor is to be tried. Should this give no promise of success after several days' trial, vaginal hysterectomy is the most rational procedure.

MALIGNANT DISEASES OF THE FEMALE GENITALIA.

THE term "malignant" is applied to those affections of the female genital organs which progress toward a fatal termination and have a tendency to return after removal. They are attended with a characteristic rapid involvement of the surrounding tissues and a marked general infection, as is evidenced by cachexia, debility, and the metastatic involvement of the internal organs.

At first these diseases are local, and if early recognition be followed by immediate removal, a perfect cure may in many cases be expected. After attaining a considerable size and involving the inguinal or post-peritoneal lymphatic glands their removal is simply palliative.

The malignant diseases to which the female organs of generation are subject are, in the order of their frequency, carcinoma, scirrhous and medullary, epithelioma, and sarcoma. Occasionally a mixture of carcinoma with sarcoma is observed, and malignant degeneration of benign tumors, such as fibroids, occasionally occurs.

MALIGNANT DISEASES OF THE EXTERNAL GENITALS.

Carcinomatous tumors are frequently observed in women in the organs of generation, but malignant tumors of the external genitals are more rarely met with.

The forms of malignant tumors of the external genitals, in the order of their frequency, are, epithelioma, scirrhous carcinoma, sarcoma, and medullary sarcoma.

Epithelioma develops usually on the lower part of the inner surface of the greater labium in the form of small, round, hard nodules which project above the level of the mucous membrane and have a rough, uneven surface. They are usually of a whitish color, and may remain for a long time unnoticed. They grow slowly in their incipiency and are painless. Sooner or later the vascular supply to the tissues is increased, and the growth becomes more rapid, the superficial epithelial layer is lost, ulceration begins and spreads to the surrounding tissues, and the original seat of disease progressively increases in area. The rounded form of the original nodule is preserved for a long time by the even extension of the induration. The ulcers are surrounded by hard, raised margins of a bluish-red color, covered with rough granulations, and bathed in a purulent ichorous secretion with unpleasant odor. The ulcers, later in the course of the disease, may become the seat of papillary excrescences which at times attain a large size.

As soon as the purulent sore is formed the induration spreads more rapidly, and usually in the direction of the long axis of the greater labium, and upon its inner surface. It is exceptional for it to extend beyond the myrtiform caruncles or to the abdominal wall.

In the course of its growth the epithelial cancer usually first involves the lesser labium, then the prepuce of the clitoris and the clitoris itself. These parts redden, become swollen and indurated, and then ulcerate, forming a long indurated ulcer of a dirty-red color, with irregular edges, extending from the lower part of the greater labium to the mons Veneris. It is rare for the disease to spread to the labium of the opposite side.

The inguinal glands do not become infiltrated until the ulcerated sore has existed for a long time. When this occurs the disease rapidly attacks the deeper tissues which up to this time have not shared in the involvement. The entire labium assumes a dark-red color and becomes swollen, hard, and painful. The epithelial sore advances to the perineum and the thigh, forming a deep ulcer with an irregular surface. One or more of the inguinal glands may harden, take on a rapid growth, ulcerate through the skin, and form a sore extending deeply into the tissues.

The ETIOLOGY of epithelioma is but little known. It occurs only in the later years of life, and most frequently about the time of the menopause. Heredity appears to have no influence in its occurrence. While it usually has its seat on one side of the vulva, it has been observed primarily on both labia. Blows and falls upon the labia have been referred to as causes, but it is difficult to decide what causal relations, if any, they hold to the disease. The pruritus which always accompanies epithelioma of the vulva, and is most violent in the beginning, has been by some authorities considered not a symptom of that disease; they contend that the epithelioma is a result of the continuous rubbing and scratching of the parts for the relief of the pruritus. This theory, however, has gained few converts, and is most probably not the correct one.

Epitheliomatous nodules may exist for months without producing symptoms other than obstinate pruritus, or materially changing their form or size. As soon as ulceration begins the process becomes rapid, and usually causes death in two years. There is persistent pain, which is not so severe as in other forms of cancer. The patients suffer from insomnia, are wasted, and gradually acquire an earthy complexion. The appetite is almost completely lost. The secretions from the ulcerated surfaces are not so copious or so offensive as those from cancer. Hemorrhages may occur, but are not common. The loss of flesh and strength progresses rapidly, and the patients die, usually in about two years, from chronic septic infection.

The TREATMENT of epithelioma of the vulva consists in its early excision, including enough healthy surrounding tissue to ensure its complete removal. The use of caustics, at any stage of the disease, for the removal of the growths, cannot be too emphatically denounced as unscientific and untrustworthy, increasing the sufferings of the patients and giving them no assurance of complete removal. The use of caustics is nearly always followed by a quick return of the disease, whereas if the growth be early and freely excised, before there is involvement of the inguinal lymphatics, the chances for a perfect cure are, in some cases, fair. Even where glandular enlargement of the inguinal lymphatics is present, excision of the growth and removal of the chain of glands will most probably prolong the life and will certainly relieve the sufferings of the patient. If the infiltration has spread over the perineum and on to the thighs, or if the inguinal lymphatics have ulcerated, the treatment should be, naturally, palliative. For these advanced cases the use of compresses wet with a saturated solution of chlorate of potash has been recommended.

Scirrhous carcinoma, sarcoma, and *medullary sarcoma of the vulva* as primary growths are extremely rare. The point of origin of these tumors is usually the greater labium. Scirrhous carcinoma has been observed in the clitoris and in the tissues adjoining the clitoris. Sarcomatous growths may originate in the nymphæ. Medullary sarcoma has been observed to grow from urethral caruncle.

The growth usually develops as a deeply-seated nodule, which rapidly spreads toward the skin surface. The overlying skin becomes adherent and ulcerates, forming an irregular, uneven sore, secreting a copious purulent, ichorous discharge. It is a disease essentially of old age, occurring usually between the sixtieth and seventieth years.

The SYMPTOMS are much more violent than those of epithelioma. In the early stages there are pruritus, increased vaginal secretion, and the mechanical inconveniences of the tumor according to its situation. The pricking, tearing carcinomatous pains occur early. The purulent ichorous discharges are profuse. Copious, weakening hemorrhages frequently occur. The inguinal lymphatics are early involved. The patients, as a rule, rapidly decline in health, and soon die through progressive loss of strength and metastasis to the internal organs.

If the case is seen before extensive involvement of the inguinal lymphatics has taken place, the growth should be freely excised with the knife or removed with the Paquelin cautery. The operator should remove all doubtful parts, without fear of a too great loss of tissue. Unfortunately, most of these cases come under the gynecologist's notice when wide extension of the growth and the involvement of the lymphatics render the treatment only palliative and symptomatic. These cases then require the use of antiseptic and disinfectant washes to correct the fetor of the discharges, alum and Monsel's solution to control the hemorrhages, and the plentiful use of opium to render the patients' last days as comfortable as possible.

Carcinoma of the urethra is a very rare disease, and usually secondary to cancer of the external genitals or vagina. Carcinoma of the bladder rarely involves the urethra.

The TREATMENT consists in excision. If removal of the mass is not possible, the urethral canal should be kept open by the daily passage of the catheter. Should the growth become too extensive for this, an artificial vesico-vaginal fistula should be made to provide for the escape of the urine. Local cleanliness and anodynes for the relief of the pain are to be mainly relied upon when the disease has progressed too far for surgical relief.

Periurethral cancer develops in the form of nodules in the vestibule of the vulva near the urethral orifice, or in the cellular tissue along the sides of the urethra without involving its walls. The mouth of the urethra is usually secondarily involved. The nodules are at first hard, non-ulcerated, painful upon pressure, and occasionally the seat of lancinating pain. The pain usually first causes their discovery. At times they are not observed until ulceration has occurred and hemorrhage invites search for its cause. The nodules rapidly infiltrate the surrounding tissues, filling the whole vestibule, following the course of the urethra to the neck of the bladder and to the pelvic fascia, and finally extending over the symphysis and descending rami of the pubis, and involving all of the included tissue.

The treatment is operation if early seen—palliative if there is extensive involvement.

MALIGNANT DISEASE OF THE VAGINA.

The vagina may be the seat of carcinoma, epithelioma, or sarcoma. The carcinomatous and epitheliomatous affections are usually secondary, while the sarcomatous are principally primary growths.

Sarcoma of the vagina appears either in the form of a circumscribed rounded tumor growing from the submucous tissue or as a diffuse superficial degeneration of the vaginal wall. Tumors of the first variety may be readily confounded with fibro-myoma, and the second form may be mistaken for carcinoma. The growth may occur as a small warty tumor, or as a rounded or oval nodule which may reach the size of a goose-egg. The usual seat of sarcoma of the vagina is upon the posterior wall. The circumscribed submucous sarcomata are usually composed of spindle cells; they ulcerate late in their course, and occasion symptoms analogous to those of the fibro-myomatous tumors of the vagina. There is pain, especially at night, obstruction of the vaginal canal, and hemorrhage after ulceration has taken place.

The superficial sarcomatous degeneration of the vaginal wall occurs as a small tumor, usually upon the posterior wall, which slowly increases in size and resists treatment. Finally, it loses its mucous covering, and forms an ulcer with elevated edges and covered with readily bleeding granulations. Involvement of the inguinal glands does not take place until late in the disease. Hemorrhage is a prominent symptom, occurring after violent motion or excited by coitus or by straining at stool. The entire periphery of the vagina may finally become involved.

The DIAGNOSIS cannot be made with certainty without microscopic examination of pieces of the growth. A strong presumption of the presence of the disease is not, however, difficult to establish.

The PROGNOSIS is more favorable in the circumscribed sarcomata than the diffuse, on account of the greater probability of their complete removal, although it is extremely bad in both.

The TREATMENT in the circumscribed form is operation if seen before ulceration and lymphatic involvement has occurred.

In this, as well as in the diffuse form, the treatment is identical with that of carcinoma, if the disease has progressed beyond removal by the knife.

Carcinoma and Epithelioma of the Vagina.—Secondarily, the vagina is frequently invaded by carcinoma and epithelioma; it is rare, however, to find these growths occurring primarily. It may be involved by the extension of uterine carcinoma, of carcinoma of the rectum, vulva, urethra, least frequently of carcinoma of the bladder, and finally, as metastatic nodules following the removal of a primary cancer. The primary cancer of the vagina appears principally in two forms: papillary epithelioma, which is most frequent, or diffuse carcinomatous infiltration of the vaginal wall.

The first form appears as a circumscribed sessile growth, most frequently situated upon the posterior wall. The second form is a carcinomatous infiltration of the vaginal wall, usually circular in outline, involving large areas of tissue and occupying the mucous membrane and submucous layer. It may be of either the medullary or scirrhous type.

Concerning the ETIOLOGY very little is known. The cases occur with greatest frequency between the ages of thirty-one and forty. Young individuals are seldom affected. Traumatic insults—such, for instance, as the pressure of badly-fitting pessaries—have been urged as causes. But this opinion is unquestionably erroneous. We lay stress upon this point, because among the laity, cancer even of the womb is so commonly attributed to the irritating pressure of pessaries, that the physician is often much hampered in their use by the fears of his patient. Primary cancer of the vagina is extremely rare. In a large experience but three cases of it have been seen by the author. In each case the sore was just behind the cervix, yet in not one had a pessary ever been used by the patient. Of course to cancer of the womb the pessary can bear no causal relation whatever, because it does not come in contact with that organ at any point.

In the course of carcinoma of the vagina, in all its forms, there is a rapid progress toward ulcerating degeneration of the tumor, while peripherally and upon its base the neighboring tissues are invaded. By the advancing destruction of the tumor the cancerous ulcer is formed which may readily perforate into the neighboring cavities. From the frequent seat of the neoplasm upon the posterior vaginal wall, recto-vaginal fistula is usually the first to form. The further extension in the lymph-channels involves, in sympathy, the lymph-glands in the pelvic connective tissue, and, if the growth is deeply seated, also the inguinal glands.

The SYMPTOMS consist principally of hemorrhage, ichorous discharge, and pain. Occasionally the patient complains of the mechanical inconveniences of stenosis and of obstruction of the lumen of the vagina, as impediments to sexual intercourse, or the disease may first be recognized during labor as obstruction in the birth-canal. Lastly, those disturbances arising from the involvement of the neighboring organs, the rectum and the bladder, may be the first clue to the disease.

The essential and never-failing symptoms are the anomalies of secretion—hemorrhage and the watery and ichorous discharge. These depend for their prominence upon the form and vascularization of the carcinoma and the stage in which it comes under observation. The hemorrhage usually first makes its appearance after coitus or after the straining at stool. Death occurs usually after spreading of the ulceration from the progressive debility caused by the hemorrhages and discharges. It may also occur in very vascular growths from hemorrhage. Pregnancy may occur in the course of vaginal carcinoma, and the growth then forms a serious complication in labor.

The requisites for the DIAGNOSIS of vaginal carcinoma are the presence of either a firm sessile tumor immovably fixed in the tissues, with an ulcerated surface, or an infiltrated ulcer. Serous or ichorous discharge is always present, and hemorrhage is easily produced by contact. Papillary epithelioma may appear as a cauliflower growth, and is to be distinguished from unusually large benign papilloma by the greater tendency to hemorrhage and the striking brittleness of its tissue. From sarcoma the differential diagnosis is to be made only by the microscope. It is of importance to determine if the carcinomatous growth be of primary or secondary origin. A thorough investigation of the neighboring organs and the position of the growth will determine this question.

The growth is only to be regarded as a primary vaginal carcinoma when rectum, vulva, bladder, and urethra are excluded as points of origin, and the portio vaginalis remains uninvolved or is attached only externally next to the vaginal growth, and no other distant organ is the seat of cancerous disease. The epithelial and papillary forms of cancer usually involve the vagina secondarily by extension of their growth from the neighboring organs by continuity of tissue. Carcinoma developing from infiltrated nodules may occur in the vagina by metastasis from distant organs, as cancer of the stomach.

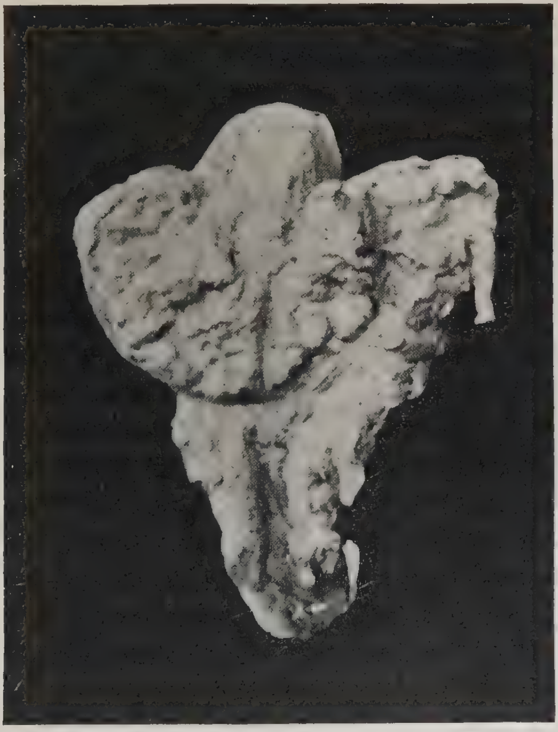
Unfortunately, in most cases of cancer of the vagina it is impossible to remove the entire growth. Destruction of the mass has been fruitlessly attempted with the sharp curette, the galvano-cautery snare, and cauterization with the most varied corrosives. Yet under certain circumstances one is forced to employ them. When the tumor is so far circumscribed that its total extirpation with enough surrounding healthy tissue to ensure its complete removal is possible, this is the only procedure. The operator should not hesitate from fear of too extensive a wound to remove all suspicious tissue. Should the inguinal chain of lymphatics be enlarged, they too should be removed. Owing to the elasticity of these tissues it is often possible after extensive removal of the vaginal substance to unite the edges of the wound by suture.

Usually the cases come under notice too late for operation. The TREATMENT is then palliative. The hemorrhage and discharge are best controlled by the destruction of the cancerous mass by the use of the curette, galvano-cautery, or corrosives. Great care must be exerted in applying these means that the bladder, rectum, or peritoneal cavity is not opened. Vaginal suppositories, containing equal parts of pure pepsin and salicylic acid—say, from five to ten grains each—have been found useful. Sometimes the dry powder is applied directly to the ulcer, and confined there by a tampon of cotton. This application is very irritating to the vulva and outlying genitalia, which should therefore be protected by a coat of vaseline or of zinc ointment. The hemorrhage may become very alarming, and require tamponing of the vagina with gauze wet in saturated alum solution or with absorbent cotton that has been wet with Monsel's solution and dried. Later in the disease the discharges will require suppositories of chloral and tannic acid, or douches of peroxide of hydrogen or permanganate of potash, to correct their odor. The pains imperatively demand the use of narcotics, and, as in all cases of advanced cancer, these drugs should be given in increasing doses according to the effect upon the patient. There is no excuse for allowing these doomed women to suffer more pain than is necessary, and the physician is not doing his whole duty if he neglects to provide his patient with the comfort which opium gives.

SARCOMA OF THE WOMB.

Primary sarcoma of the uterus occurs anatomically and clinically in two forms—fibro-sarcoma, or sarcoma of the uterine parenchyma, and diffuse sarcoma, or sarcoma of the uterine mucous membrane. Both forms may consist of round or of spindle cells.

FIG. 260.



Sarcoma of the Body of the Uterus.

Fibro-sarcoma forms a more or less firm, occasionally soft, circumscribed, rounded tumor growing from the uterine parenchyma and resembling the fibroid tumor. Like these growths it may be submucous, subserous, or interstitial. The growth occurs in the form of rounded nodules, of a rich cellular formation, which appear to have invaded the original tissue. When submucous or subserous, they form sessile tumors projecting into the cavity or upon the surface of the uterus. As interstitial growths they are imbedded in the tissues of the uterus and form thickenings of its wall. The isolated sarcomatous tumors are usually composed of round cells. The spindle-celled fibro-sarcoma usually occurs in disseminated nodules lying in the uterine parenchyma, but it may infiltrate equally the whole organ. It is rare for this growth to appear upon the cervix. Often the uterine fibro-sarcomata are the result of sarcomatous degeneration of fibro-myxomatous tumors.

The diffuse sarcomatous tumors grow from the connective tissue of the uterine mucous membrane, and are mostly composed of small round cells, seldom of spindle cells. They appear as very soft knotty or papillary growths upon the mucous membrane. They may occur in single areas or infiltrate the whole mucous membrane. The growth usually involves the uterine wall, which it penetrates, forming a tumor upon the peritoneal surface. Those intestines lying near become involved, adhesions are formed to the abdominal wall, and the neighboring organs are invaded by the disease. The soft round-celled medullary sarcomata may present themselves as polypoid growths attached to folds of the mucous membrane. They are grayish-white in color, resembling brain-matter, rich in blood-supply, and of soft consistency. The surface is usually necrotic, uneven, and dotted over with fungus-like masses. The necrotic surfaces are covered with dark-brown colored sloughs. These growths are closely related to the cancerous degenerations of the uterine mucous membrane. The cervical mucous membrane seldom appears to be the point of origin of the diffuse sarcoma.

Concerning the CAUSES of the origin of sarcoma little is known. It may occur at any age. We have observed it as early as the twentieth year and as late as the seventieth. But undoubtedly there is a special predisposition for the development of sarcoma at the climacteric period. Fibro-myomata have been observed to undergo change into sarcoma in a number of cases. It is a disease which especially attacks nulliparæ. It has been remarked that diffuse sarcoma originates in the interglandular connective tissue of the mucous membrane, just as carcinoma of the body of the uterus develops from proliferation of the cells in the glandular element.

As the SYMPTOMS of the two forms of sarcoma differ essentially in character, they will be described separately.

The most prominent symptoms occasioned by the fibro-sarcomata are those caused by pressure according to the position and the size of the tumor. Pain resembling in character labor-pains, hemorrhages, and watery discharge are the cardinal symptoms. The pain may be wholly absent or be but slight. It is occasioned by the attempts on the part of the womb to expel the mass, and is referred to the dorsal and hypogastric regions. Hemorrhage is first recognized as profuse menstruation, and does not change its character until a late stage of the disease. The discharge may be exceedingly profuse, of a bloody, serous, or watery character, and finally with a very unpleasant odor.

The uterus is much increased in size and the cervical canal is tense. The cervical canal may be, however, dilated and patulous, permitting the introduction of the finger. The tumor-masses may project from the os into the vagina, or with a patulous cervical canal the finger may recognize the soft growths in the uterine cavity. The tumor may be expelled into the vagina by uterine contractions, which may indeed invert the womb. Pieces of the mass can be readily broken off by the examining finger before sloughing has taken place.

There is a marked cachexia and rapid loss of flesh and strength, and finally death from peritonitis; pyemia, ileus, or metastasis takes place, ushered in by extreme anemia. The metastasis is more frequent in fibro-sarcoma than in the diffuse form, and occurs in the lymphatic glands, the lungs, the liver, and the pelvic cellular tissue.

In the *diffuse sarcomata* there is usually no distinct tumor to be recognized externally. The womb is enlarged and fixed. The growth may push itself through the os, giving the picture of a circumscribed tumor. This projection through the cervical canal is not due to expulsive efforts on the part of the womb, as in the fibro-sarcoma, and is not attended with labor-like pains, but is due to the rapid development of the neoplasm. Pieces of the mass readily break off, and are carried away by the discharges. Hemorrhage is seldom absent, and is usually violent. The menstrual type is soon lost, and as the disease usually occurs in the climacteric period or later, the hemorrhages excite alarm. The hemorrhage may be replaced, especially in the beginning of the disease, by a continuous slight bloody discharge. Along with these profuse losses of blood is a rich watery or bloody-serous discharge, that is present before sloughing of the tumor-mass has taken place, and is usually of a disagreeable odor. Sloughing occurs early, and with it the discharge takes upon itself the peculiarities of the secretion from the gangrenous parts. The pain, very seldom absent, is often of great violence. It is of a tearing character, and depends for its intensity upon the depth to which the sarcomatous infiltration has penetrated. Death occurs, preceded by rapid debility and extension of the growth through the uterine walls to the neighboring organs and pelvic floor.

The certain DIAGNOSIS of sarcoma of the womb is arrived at only by the careful microscopical examination of its structure. The examination of small particles contained in the discharges is not sufficient to establish an absolute diagnosis. Either pieces of the extirpated growth or portions of the tissue removed deeply from the tumor by means of the sharp curette should be used. The presence of sarcoma or the sarcomatous degeneration of a fibroid tumor must be suspected when a fibrous tumor occurs in the climacteric period, or when a small fibrous tumor, formerly occasioning no symptoms, at this time or later begins to increase in size or to be attended with pain and hemorrhage. The occurrence of hemorrhage in fibroma of the uterus, when menstruation has for a long time ceased, should always excite grave suspicion. The hemorrhage in fibro-myomata ceases or lessens when the climacteric is passed. The copious bloody-serous discharge is a still more characteristic symptom, which, while not always present in fibro-sarcoma, never accompanies benign fibrous tumors except when sloughing has occurred. A further characteristic symptom of sarcoma is the abnormally rapid growth, especially if observed in the climacteric years, when fibromata no longer increase in size. This is convincing when the growth is soft and accompanied by unusually violent pain. The softness of the growth on palpation, permitting the ready penetration of the finger into the tumor-mass, is, when sloughing fibroid is excluded, decisive for the diagnosis of sarcoma.

When to these symptoms are added an unproportionate loss of flesh and strength, cachexia, and anemia, the diagnosis is made with ease. The exact diagnosis should always be made after extirpation by microscopical examination.

The differential diagnosis between diffuse sarcoma and carcinoma of the fundus is never easy and may be impossible. From carcinoma of the vaginal portion of the womb sarcoma may be easily recognized. In the latter disease the sarcomatous mass will be found projecting into the vagina through a healthy cervix, the margin of the os being recognized by the finger as a constricting band.

Much more difficult is the recognition of diffuse sarcoma from certain benign hypertrophies of the uterine mucous membrane, as endometritis fungosa. This affection seldom occurs after the climacteric, as is the case with diffuse sarcoma; the age of the patient is therefore of some help in establishing the differential diagnosis. The general condition of the patient is of great importance. In fungoid endometritis the patient may be anemic, but never becomes cachectic. The bloody-serous discharge is seldom present. The os is more or less patulous in diffuse sarcoma, admitting the finger. It is closed in endometritis. In sarcoma the uterus is large, and tender to pressure; in endometritis the size is not increased and there is no tenderness. The rapidly-proliferating sarcomatous growth frequently projects from the os, polyp-like, into the vagina; this never occurs in benign hyperplasias of the uterine mucosa. The benign hyperplasias always remain superficial growths, never involving the uterine substance. Sarcomatous growths belong usually to the deeper layers from the beginning, and infiltrate rapidly the uterine substance. The polypoid growths of fungoid endometritis sometimes grow again after removal, yet the return growths differ wholly from the residual growths of sarcoma.

The microscopical examination of the pieces found in the discharges often leads to error, as in sarcoma they may long consist of healthy tissue, and in simple hypertrophy, of granulation tissue resembling small round-cell sarcoma. Errors may be avoided by examining several pieces of the growth removed from different positions.

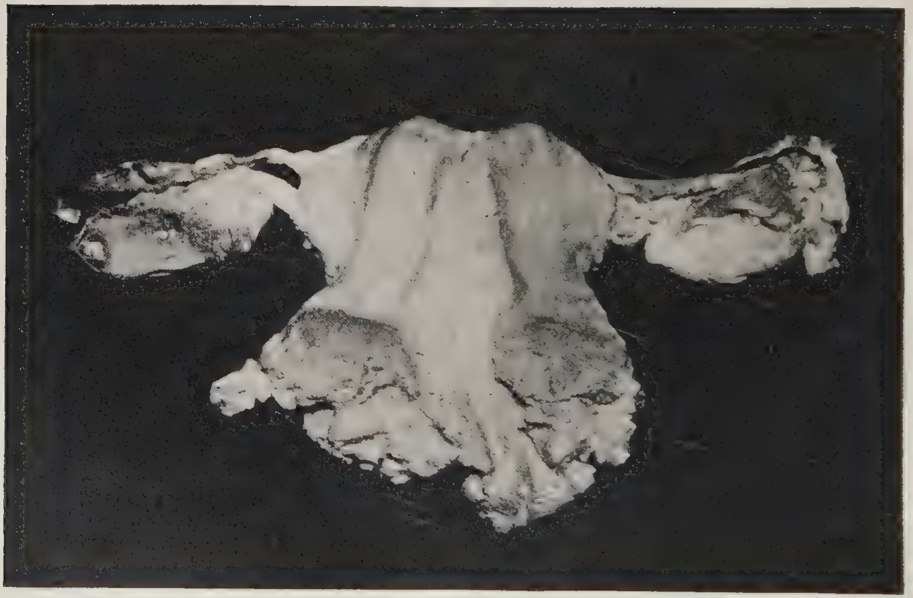
The PROGNOSIS in both forms of sarcoma is hopeless when the whole growth cannot be removed by operative measures. These growths may progress, slowly or quickly, to death. Compared with the carcinomata, the prognosis for cure by complete removal is more favorable, as the lymphatic involvement is slower and the early recognition more probable.

The TREATMENT consists in total hysterectomy when the disease is recognized before involvement of the broad ligaments or of neighboring tissues has rendered the operation impracticable. Only when the removal is no longer possible should the treatment be symptomatic. In the abandoned cases the symptoms may be for a time controlled and the life of the patient prolonged by scraping away the diseased tissue with a sharp spoon and cauterizing the surface of the wound. The cauterization may be performed by the use of chromic-acid solution, fuming nitric acid, chloride-of-zinc solution, or, better, by the Paquelin thermo-cautery or by the galvano-cautery porcelain burner heated to a red heat. The further treatment is analogous to that of carcinoma—tonics and attention to the bowels, whilst opium must be given to relieve pain.

CANCER OF THE CERVIX.

Of all women who die from cancer, one-third die from cancer of the uterus. The disease is not so common in the negress as in her white sister. Uterine cancer occurs most frequently between the ages of thirty and forty years and between fifty and sixty years. It has not been observed under seventeen years, one case being reported in a girl of that age. The frequency of its occurrence increases from thirty years to the menopause, after which it

FIG. 261.



Epithelioma of the Cervix Uteri, showing the well-defined limitation of the disease.

again decreases. Very many cases, however, have been observed after the climacteric period.

Sexual intercourse, especially if excessive, is probably one of the factors in the causation of carcinoma, as is shown by the frequent occurrence of these neoplasms in married women. Only a small percentage of patients suffering from uterine cancer are nulliparæ. Deep laceration of the cervix with ectropion of the lips, if unheeded, is a very fruitful predisposing cause of cervical cancer. It would appear that the constant irritation to which the raw, granular everted lips are subjected in locomotion and coition is the dangerous element. Long-standing cervical catarrh has also, perhaps, a causative influence. Finally, the cervix uteri, like most other ostia, as the lip, the pylorus, the cæcum, and the rectum, is a favorite seat for cancer.

Heredity exerts a considerable influence in its causation. Among the higher classes of society carcinoma relatively seldom occurs, while among those of the lower grades, who are required to struggle for the necessities of life, cancer is observed with striking frequency. In this respect the occurrence of cancer is directly in contrast with that of uterine myoma.

Epithelioma of the cervical mucous membrane may grow from the squamous epithelium of the rete Malpighii, from the cylinder epithelium within the cervix, or from the glandular epithelial cells. Cancer of the uterine parenchyma has its origin in connective-tissue cells.

Cancer of the cervix may present itself either as a papillary or cauliflower growth, a nodular or parenchymatous growth, or a superficial or ulcerating disease of the mucous membrane.

The cauliflower or papillary form grows from the intravaginal portion of the cervix, and may be limited to it for a long time. It may develop so profusely as to hide the remaining healthy portion of the cervix and the os, appearing as a large papillary growth filling up the upper portion of the vagina. Finally, the growth spreads to the vaginal vault, which it deeply involves, all the tissues surrounding the uterus sharing in the infiltration. Extension may take place through the cervical canal to the endometrium by continuity of tissue, and the body of the womb may become involved.

The nodular or parenchymatous form of cervical cancer has its origin in one or more nodular formations in the cervical mucous membrane. Usually they are situated just beneath the membrane, although they may be upon its surface. The nodules soon part with their covering of mucous membrane, and form ulcers which fuse together and, by extension, involve the fundus of the uterus and the vaginal cul-de-sac. The bladder, rectum, and pelvic cellular tissues may finally become invaded.

The superficial or ulcerative form begins as an infiltration of the mucous membrane of the cervix. The infiltrated area soon parts with its covering of mucous membrane and ulcerates. The ulcer progressively involves the deeper tissues, losing its necrotic surface as it advances, until finally the whole womb may be converted into a crater-like cancerous mass. By extension the peri-uterine tissues are invaded, while the vagina may be but little involved.

To the malignancy of the cervical carcinoma is added increased danger from the fact that the beginning, as a rule, is attended by no symptoms, and the disease is almost always discovered when it is too late for radical treatment. Only in the superficial or ulcerative form of cancer is the early stage attended with discharge and occasional hemorrhages. The other forms of cancer are attended with very slight discharge, and, other symptoms being absent, the case does not come to seek the advice of the gynecologist until the cancerous sore has already formed. This is attended with a more copious discharge and bleeding, which may occur periodically and be confounded with metrorrhagia from other causes. If the patient has not passed the menopause, the hemorrhages begin as increase in the normal menstruation, but later on occur between the periods. Frequently the first symptom noticed is hemorrhage following coitus. In the scirrhous form of the disease the bleeding may be absent, yet it very generally accompanies the disease, and it may be very alarming. The most extreme grade of anemia may result from the repeated hemorrhages, yet they very rarely are so copious as to produce death.

The first hemorrhage is usually followed by a sanious discharge, which may be slight and attract no more attention than the mucous discharges preceding it. The discharge may be purely serous and devoid of odor. As soon, however, as ulceration has taken place the discharges excite suspicion. Their color is at first dark from the admixture of fragments of gangrenous tissue, then grayish-yellow, green, brown, or black, and of a sickening smell. The pain at the beginning is slight or wholly wanting. Violent pain occurs when the infiltration has involved the pelvic connective tissue. As a rule, the pain is proportionate in severity to the size and the hardness of the infiltrated area. The pain is most violent in slightly ulcerated carcinomata, or in those ulcerating late, when the hard, unyielding proliferations fill the entire pelvic cavity.

To the true pains of carcinoma, of a pricking, lancinating, or burning character, are soon added those of chronic peritonitis occasioned by the inflammatory adhesions which form as soon as the neoplasm has invaded the peritoneum. The cervical canal in its involvement may be so narrow as to retain the secretions of the uterine cavity. Attempts on the part of the uterus to expel this dammed-up secretion excite violent colicky pain. Complete closure of the cervix may occur and hematometra or pyometra result, but this is very rare.

The peculiar hardness of the abdominal wall is in a great measure occasioned by the pain, and is characteristic of the later stages of carcinoma. The muscular tissues are strongly stretched, the intestines elevated, and the pelvic walls give to the touch a peculiar sense of hard resistance.

The other symptoms are occasioned by the extension of the disease to the neighboring organs. Usually the growth extends to the anterior vaginal wall and involves the bladder. As a result of the infiltration of the submucous layers of the bladder-wall the mucous membrane becomes irritable, and there is pain on micturition with vesical tenesmus. It is seldom that there is retention of urine. As the growth advances the ureters become compressed or share in the involvement; their calibre is narrowed, and hydronephrosis may result. Soon the cancerous masses in the bladder-wall ulcerate; the tissues intervening between the bladder and vagina become progressively thinner, and finally are perforated. Frequently the rectum is also involved. Preceding the involvement of the rectum there are usually obstinate constipation and rectal catarrh from the pressure of the tumor obstructing its calibre. Following the rectal involvement is a progressive thinning of the recto-vaginal septum by ulceration and perforation, with the production of a recto-vaginal fistula.

The patient may remain in excellent general condition until the disease has attained extensive development. Carcinomatous disease frequently attacks large and strong women. The nutrition of the body then soon begins to fail on account of the continuous drain of blood and serum from the diseased cervix, of the accompanying disturbances in the intestinal tract, and of the general degenerative effect of the cancerous disease on the blood. Usually there is obstinate constipation, although diarrhea may be present. There is a progressive loss of appetite, which may amount to an absolute disgust for food. Frequently there is vomiting, which may be the result of various causes. The stinking odor of the discharges is perhaps a decided element, and the uremic poisoning from pressure on the ureters has much to do with its production. The pain deprives the patient of sleep. Cachexia soon results from the frequent loss of blood and the profuse discharges. The legs become œdematous. At a later stage diarrhea sets in, and the patients lose flesh and strength rapidly. Fortunately for the patients, uremia, occurring from the slow occlusion of the ureters toward the close of the disease, clouds the intellect. They become more indifferent to their condition; the anxious expression is lost; the complaints of pain are less frequent; and they lie listless and dull upon their beds, without even attempting to change their positions. Gradually the cloud darkens, occasionally broken by a lucid interval, until death ends their pitiable existence.

In the majority of cases death takes place from uremic poisoning when the ailment is left to run its course and the patient is not carried off by intercurrent disease. The ureters are found thickened, often to the size of the finger, and the pelvis of the kidney greatly distended with urine. Purulent peritonitis may occur, and hasten the woman's end before the cancerous disease has involved the ureters. Exhaustion is of course a large element in the causation of death.

It is difficult to estimate the COURSE of the disease because the early stages are not recognized. As a rule, we may say that death occurs in from one year to one year and a half after the inception of the disease.

Carcinoma of the cervix is usually of easy DIAGNOSIS, from the fact that it is, as a rule, fully developed and often far advanced when it comes under observation. In the early stages of its development it is difficult of recognition. The cauliflower or papillary kind is the easiest to be recognized. Here the quick growth, the irregular, knotted, or cauliflower shape, and the rapid disintegration serve to make the diagnosis clear. As a rule, all sessile papillary or villous growths of the cervix are carcinomatous.

The parenchymatous or nodular form of cervical cancer is more difficult of diagnosis. It is readily confounded with myoma if the nodules are situated in the patulous cervical canal or superficially, bulging the mucous membrane of the vaginal portion. A myoma, however, is of much harder consistency, and it is seated in normal tissue, while the softer carcinomatous nodules are surrounded by infiltrated and inflamed tissue. On incising the growth the myoma cuts with considerable resistance, while the carcinoma is soft like marrow. A positive diagnosis at times cannot be made until an excised nodule has been examined microscopically.

The differential diagnosis between superficial or ulcerating carcinoma of the mucous membrane of the cervical canal and long-standing cervical catarrh is arrived at with great difficulty. In the early stage of this form of carcinoma the appearance is the same in both conditions. The folds and markings of the catarrhal mucous membrane are perfectly preserved in cancer, though the submucous layers be involved, and the evidences of the malignancy only appear when ulceration has occurred.

Severe long-standing cervical catarrhs, with thickening of the vaginal portion and nodular enlargements of the surface, frequently excite suspicion of cancer. On close examination it will be found that the nodules consist of closed follicles filled with mucus and the surface is covered with epithelium. The absence of ulceration indicates the benign character of these cases of advanced hypertrophy of the cervix. Should the cervix be eroded, the diagnosis may be made by the character of the denuded surface. In cancer the margins of the ulcer are sharp and dentated, and the surface bleeds readily. The presence of numerous follicles, studding the entire cervix or the marginal zone of the ulcer, argues in favor of a benign character of the disease. In the digital examination of cases of long-standing cervical catarrh, the sensation of an irregularly degenerated, hard, carcinomatous growth may be imparted to the finger. On examination with the speculum, however, it will be noticed that the suspicious points are clothed with epithelium, and the absence of ulcers will clear the diagnosis. It is well to bear in mind that carcinomatous growths are easily broken up by the examining finger, while chronic inflammatory changes resist even strong pressure. A positive diagnosis should not be given, however, until a careful microscopical examination has been made of pieces of the growth removed for that purpose. Care should be taken that the tissue for examination should not be removed too superficially.

When ulceration has taken place the diagnosis is comparatively easy, but it must be remembered that carcinomatous nodules of the cervix may reach a considerable size before perforating the mucous membrane. On the other hand, large ulcerating myomata which are protruding from the cervix may so resemble carcinomatous growths as to excite grave suspicion. Diphtheritic inflammatory deposits upon the cervical portion and neighboring parts of the vagina may so closely resemble carcinoma, through the uniform swelling and ichorous discharge mixed with blood, as to make the diagnosis of carcinoma doubtful.

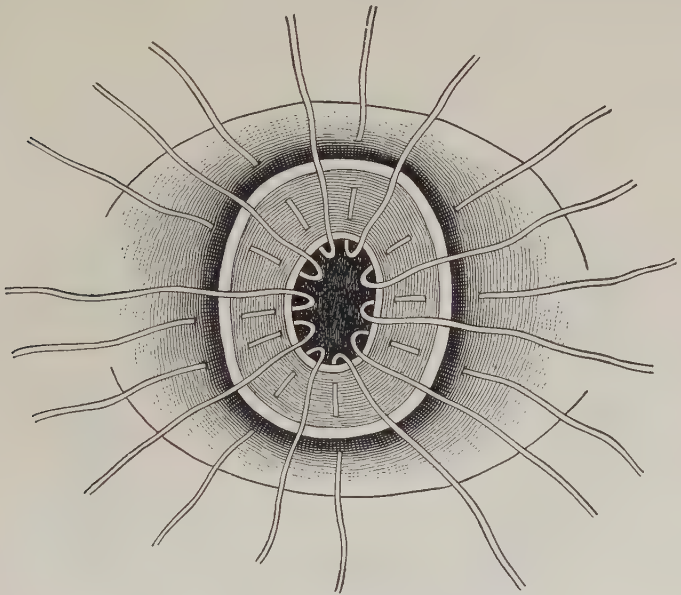
It is often difficult to determine how far carcinomatous infiltration has extended. The neoplasm often involves the pelvic connective tissue much deeper than it appears upon examination. The extension of the growth is best determined by combined examination through the rectum under ether narcosis. The mobility of the womb will also give valuable information on this point, for if that organ is firmly fixed the presumption is that the disease has invaded the peri-uterine tissues. By catching hold of the cervix with a tenaculum, and by dragging the womb down, much information can be obtained through the rectum as to the condition of the broad ligaments.

Unfortunately, the patients suffering with carcinoma of the cervix come under observation so late in its course that the total removal of the growth is usually rendered impracticable by the extensive involvement of the neighboring tissues. The condition of the patient is then most unfortunate. There is almost unbearable pain, insomnia, progressive loss of flesh and strength, and foul odor from the discharges. This condition may be long protracted, or death from peritonitis or from some intercurrent disease may relieve the patient from her sufferings. The only favorable prognosis is afforded by the earliest possible operation, when the disease is yet limited to the cervix and the whole womb can be removed.

The TREATMENT of carcinoma of the cervix is either radical or palliative. The radical treatment comprises the extirpation either of the whole womb or of the diseased portion of the cervix, with enough surrounding healthy tissue to ensure its complete removal. The former method is, in our opinion, always to be preferred to the removal merely of the cervix, because it unquestionably is the more thorough of the two operations, and because we never can tell whether the cancer is limited to the cervix or has extended to the corpus. The palliative treatment is directed only toward relieving the distressing symptoms when hope of removal of the growth has been abandoned.

Amputation of the diseased cervix may be performed by the knife, écraseur, galvano-cautery, or Paquelin cautery, and may be partial or complete. Operations performed by the knife are to be preferred, on account of the easier surgical manipulation and the more rapid healing of the wounds after suture than by those following the other methods of removal.

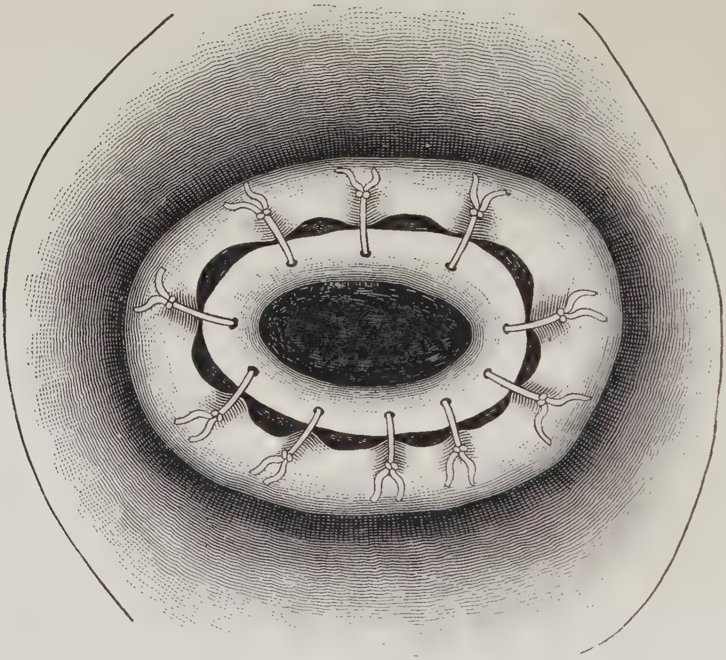
Fig. 262.



Simple Amputation of the Cervix, stitches in situ.

The partial extirpation of the cervix may be performed by two methods: either by a simple amputation of that part of the cervix projecting into the vagina, or as a modified wedge-shaped excision. The simple amputation of the cervix is less desirable than that by the wedge-shaped incision, on account of the greater accompanying hemorrhage and the greater difficulty in covering the stump. The operation is performed as follows: After thoroughly scrubbing the external genitalia and vagina with a solution of soft soap, the parts are washed in ether, alcohol, and a strong bichloride-of-mercury solution, 1:1000. The cervix is exposed by a perineal retractor, and grasped by a double tenaculum or volsellum forceps. The labia are held apart by two other retractors, and the womb is then drawn down as far as the elasticity of the uterine ligament will permit. The farther this is possible the easier is the operation. Great care must be observed in applying traction, however, when inflammatory changes coexist in the adnexa. The mucous membrane is incised by a circular incision, and the cervix severed as far as the canal. Before the entire separation it is advisable to place one or two stitches in the severed wall, leaving the ends long. These control the bleeding and act as tractors after the cervix has been completely severed. Tractors are applied by some operators before beginning the operation by passing a strong silk thread through the cervix above the field of amputation. The womb is now held fast by the tractor, the separation completed, and the sutures quickly placed, radiating from the cervical canal like the spokes of a wheel. The union of the two mucous surfaces over the stump is facilitated if the needle be introduced in the cervical mucosa, brought out midway between the cervical mucosa and the vaginal mucosa, and again introduced through the vaginal mucosa. As the circumference of the circular edge of the vaginal mucous membrane is much larger than that of the mucous membrane of the

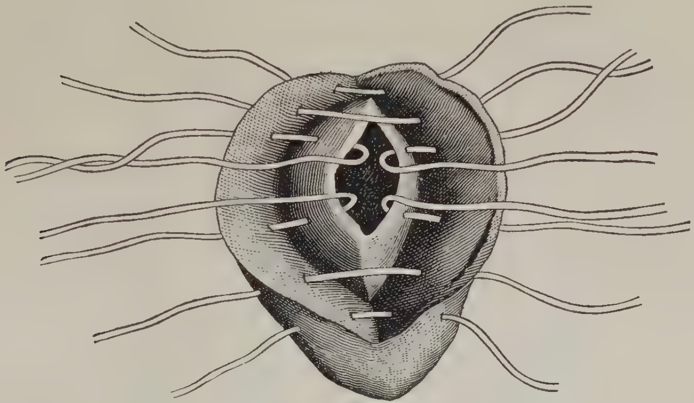
Fig. 263.



Simple Amputation of the Cervix, stitches tied.

cervical canal, and the tissues of the cervix are very hard and unyielding, exact coaptation and a smooth line of suture are never attained. The vaginal mucosa is always thrown into folds radiating from the cervical canal, but good union is ultimately obtained.

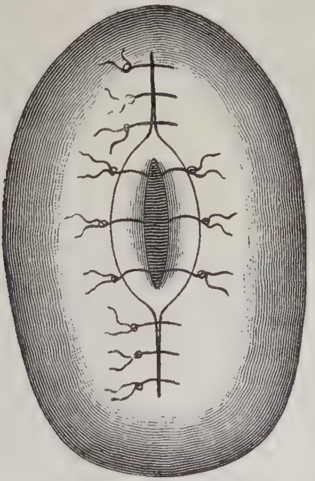
FIG. 264.



Wedge-shaped Amputation of the Cervix Uteri, sutures in place ready for tying.

In performing the wedge-shaped amputation, after cleansing the vagina and genitalia as in the former operation and exposing the cervix, the anterior and posterior lips are seized in the grasp of double tenacula and the cervix split up on either side, as high as the vaginal vault. An incision is then made in the outer surface of the anterior lip of the cervix, from without inward and upward, and

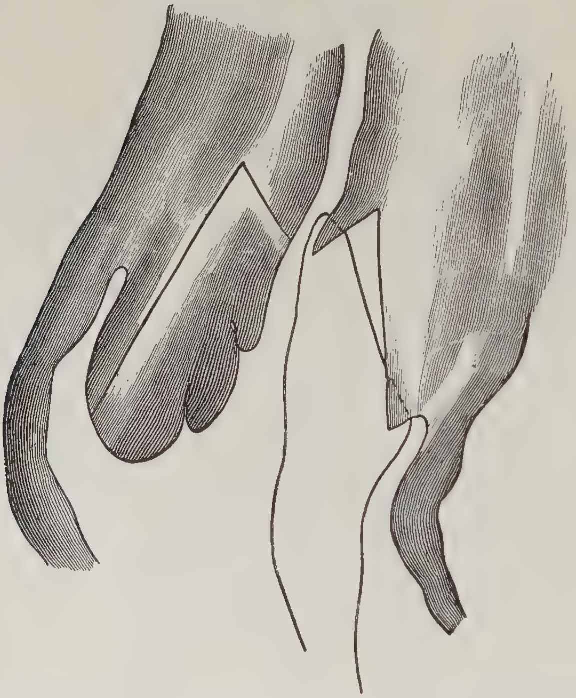
FIG. 265.



Wedge-shaped Amputation of the Cervix, sutures tied.

from the inner surface of the lip, from within outward. These two incisions intersect in the middle of the lip, giving to the excised portion the shape of a wedge. The wedge may be made large or small acording to the size of the cervix and to its hardness or softness, the object being to leave two movable flaps that may be easily approximated and sutured. Before proceeding with the excision of the second wedge several stitches are placed uniting the flaps just made, and they are immediately tied. This is done partly to control hemorrhage and partly to use them as tractors. In knotting the sutures it is more convenient to begin in the middle of the lip and tie toward either end. The posterior lip is now treated in the same manner as the anterior one. The lateral wounds are closed by one or two stitches. This method may be varied to suit the condition.

Fig. 266.

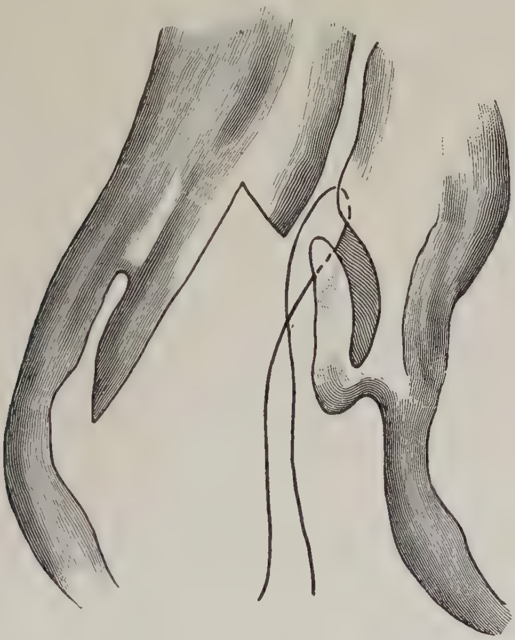


Profile of the Wedge-shaped Amputation of the Cervix Uteri, sutures in place.

The removal of the cervix with the cold wire of the écraseur is now no longer performed, but amputation with the galvano-cautery snare is still practised by some operators who wish to avoid the bloodier operation with the knife. The only commending feature of the procedure is its bloodlessness, through the cooking of the tissues and the consequent closure of the vessels before being cut. Braun advances the fanciful theory that the inoculation of the fresh wound by carcinoma germs is avoided, and contends that through the heat of the wire carcinoma germs remaining in the tissues of the stump are destroyed.

The mode of operation is as follows: After the cleansing and the disinfection of the genitalia and the vagina, and after the exposure of the cervix with the perineal retractor, one or more double tenacula are fastened in the cervical tissue and the womb is drawn down. The loop is applied at the greatest possible distance from the margin of the neoplasm, yet not so near to the bladder as to injure it. It is then drawn tightly enough to compress the tissues, while the current is closed and the wire heated to a glowing heat. By slowly constricting the wire loop the cervix is cut evenly through. An even charred surface remains, which heals with the formation of dense scar-tissue having a strong tendency to contract. The pouch of Douglas is frequently opened; this accident, however, appears to be attended with but little danger.

Fig. 267.



Profile of the Wedge-shaped Amputation of the Cervix Uteri, sutures ready to tie.

These operations have been described in order only that attention may be called to the fact that they are operations in which confidence cannot be placed, and that are therefore illegitimate procedures. In dealing with a disease so terrible as cancer and with so marked a tendency to return, the performance of any operation short of total extirpation of the cervix or of the womb seems unjustifiable. Surely if we accept the belief of scientific gynecologists, that cancer in its incipiency is a local disease, and that if early enough operated upon and the growth wholly removed there is no return, the choice of operation must lie between that of high amputation of the cervix and total extirpation of the uterus. Of these two procedures, total extirpation of the womb should, in the vast majority of cases, be the choice, for the double reason that the result is the more sure if the organ be removed entire, as it is in cancer of the breast, and that the operation of high amputation is just as difficult of performanace and as dangerous to the life of the patient.

The method of high amputation was originated by Schroeder in 1878. His technique is as follows: The vagina, vaginal portion, and external genitals are cleansed by scrubbing with a solution of soft soap and washing in ether, alcohol, and bichloride-of-mercury solution, 1 : 2000. The instruments required are to be sterilized by boiling them for ten minutes or longer in soda solution, and are then placed upon a table at a convenient distance from the operator, in the tray in which they have been boiled. The buttocks, thighs, and mons veneris are guarded by a broad strip of antiseptic gauze having a slit corresponding to the vulvar orifice. The cervix is exposed by a perineal retractor and the labia held apart by assistants. The cervix is then seized in the grasp of a double tenaculum or volsellum forceps and traction applied, the womb being drawn down as far as the elasticity of the uterine ligaments will permit. A circular incision is made from one-half to one centimeter beyond the margin of the diseased vaginal mucous membrane. There may be considerable hemorrhage from the divided vaginal arteries which will require the application of hemostats and ligatures. After the hemorrhage has been controlled it is easy with the finger to separate the cervix from the tissues front and back, traction being made upon the cervix all the while. The connective tissue here contains no large vessels and is easily separated. The cervix is then drawn strongly to one side, rendering tense the parametric connective tissue on the opposite side, which contains the uterine vessels. This tense tissue, being easily recognized by the touch, is surrounded by a ligature, as in the operation for total extirpation. The maneuvre is best carried out by a half-blunt staphylorrhaphy or aneurism needle. After tightly tying the ligature the included tissue is divided with scissors between the ligature and the cervix. This ligation should include the uterine artery. A ligature is similarly placed on the opposite side, and the tissues divided between it and the cervix. Frequently the tightly-stretched sacro-uterine ligaments interfere with the drawing down of the uterus. They may be included in a ligature and severed, when the uterus will readily descend. The ligatures should be applied as far from the cervix laterally as possible, so that the division of the tissues does not occur close to the cervix. The cervix is now transversely separated from the body of the uterus anteriorly as far as the cervical canal, and a stitch passed through the vaginal wall, the connective tissue, and the divided cervical wall, and brought out in the cervical canal. This, being tightly tied, provides the means for safely holding down the stump after complete separation of the cervix. Should there be any hemorrhage at this stage, it may be controlled by the application of several similar sutures. The posterior wall of the cervix is now cut through, and sutures passed as before around its circumference, uniting the mucous membrane of the vagina to that of the womb. As the upper end of the opened vaginal tube is much larger than that of the womb, the vaginal mucous membrane is thrown into folds by the sutures. On either side are openings in which the ligature strands lie; these require each a stitch to effect closure. If the ligatures include the uterine vessels and are tightly tied, there should be very little bleeding in this operation. The lower segment of the womb may be removed by this method if desired. Douglas's cul-de-sac is frequently opened; the author has opened it several times, but this misadventure did not increase the danger of the operation. The wound in Douglas's pouch should be immediately closed by a continued suture of fine silk or catgut. The vagina is to be carefully cleansed with boiled water and tamponed with iodoform gauze. The tampons are removed and renewed, and the vagina douched, at intervals of twenty-four hours. In from five to eight days the tampons may be discontinued, but the daily douches are persisted in. On the tenth or twelfth day the patient may leave her bed. The early removal of the stitches is a matter of no importance, and the longer they remain the easier is their removal. Usually they are removed on the eighth day. If catgut be used throughout, there is no need of paying any attention to them whatever, as the loop is absorbed and the knot then falls off.

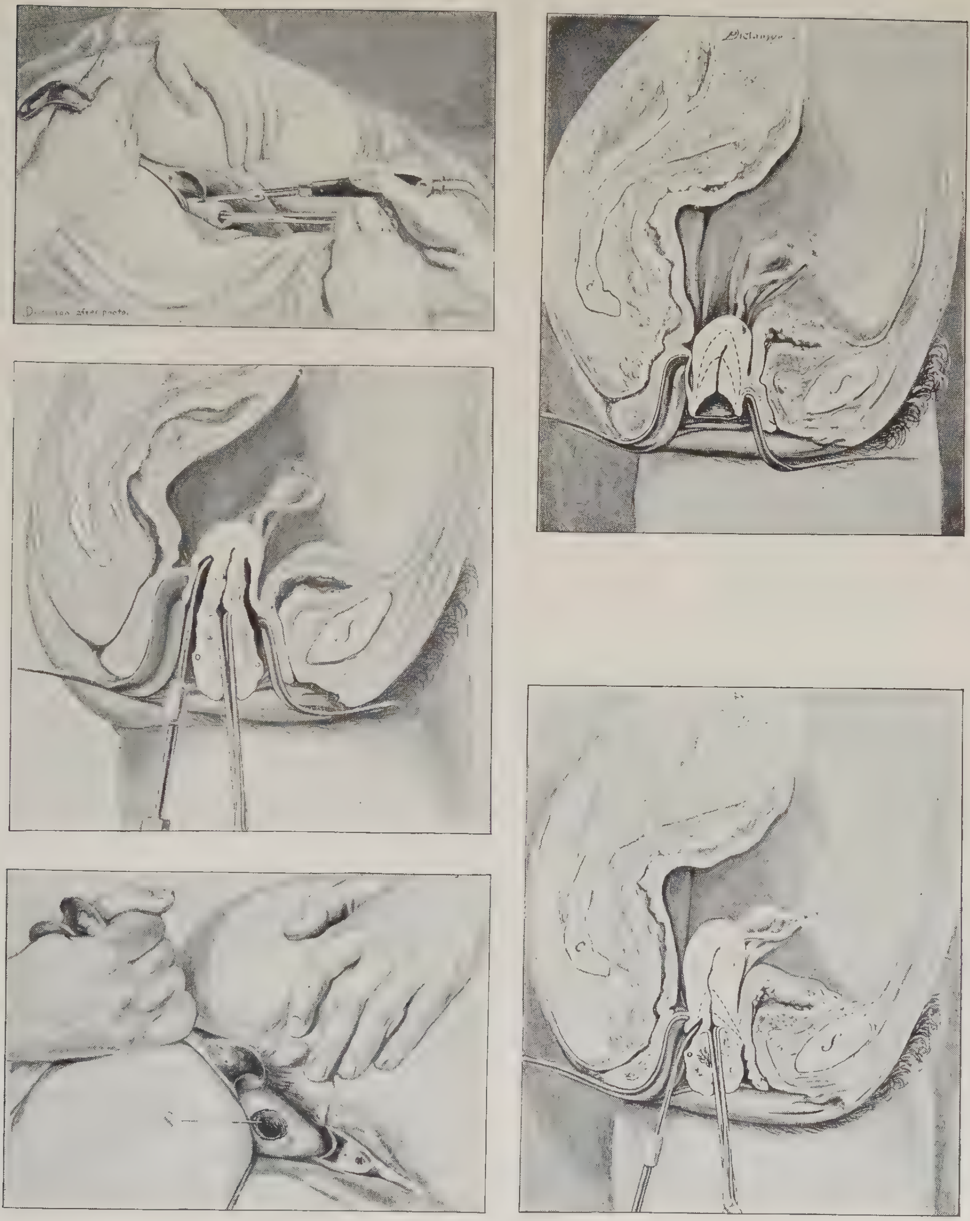
The steps of the operation are practically a combination of the first part in the vaginal hysterectomy with ligature and a simple amputation. A glance at the illustrations of these two procedures will render the steps clear.

The high amputation may also be performed by the galvano-cautery knife. The method is as follows: After exposing the cervix with a perineal retractor, and having the labia held apart by assistants, the cervix is seized by a double tenaculum or volsellum forceps and drawn down. The position of the bladder is determined by the introduction of a sound, and the site of the amputation carefully selected, so as to avoid wounding the bladder or opening Douglas's pouch. If it be found that the retro-uterine tissues are involved and that the peritoneal cavity must be opened to effect the excision, the operation should not be abandoned, for the results of such operations are said to be attended with little danger. In one such case, in which a hole was burnt into Douglas's pouch, no febrile movement whatever took place. The cervix should be amputated first, however, and afterward the retro-uterine tissues should be excised. A slightly curved cautery-knife electrode is applied cold to the point of election, the circuit closed, and a circular incision made, the cutting being finished without the removal of the knife. Should it be desirable to remove the knife in order that the direction of the incision be altered, the current should first be broken and the knife allowed to cool, in order to prevent hemorrhage.

After the circular incision has been made to the depth of about one-fourth of an inch the knife should be directed upward and inward, firm traction upon the cervix being kept up all the time. The remaining stump will be funnel-shaped, and should be gone over again and again with a dome-shaped electrode to render the baking of the tissues more thorough.

In cases requiring amputation above the internal os, the cervix should be first removed, the stump grasped on either side of the cervical canal, and the higher amputation proceeded with in the same manner as before. Thus it is possible by successive attempts to excise as high as is desired. The ragged edges are finally to be trimmed off by the cautery-knife and the cavity tamponed with iodoform gauze. The tampon is allowed to remain for forty-eight

PLATE XVII.



Removal of Carcinoma of the Uterus by the use of the Galvano-cautery after the method of Byrne.

hours. The after-treatment consists in the use of antiseptic douches.

This operation can be performed more safely with the curved knife of the Paquelin thermo-cautery, for then the degree of heat can be better adjusted to the hemorrhagic character of the tissues. For instance, if the tissues are very vascular, a dull-red heat is less likely to be followed by hemorrhage than a white heat.

We once had a terrific secondary hemorrhage follow the use of the galvano-cautery wire—a hemorrhage which was controlled with the greatest difficulty. From this cause the late Dr. Albert H. Smith of Philadelphia lost a patient of high social position several days after the amputation of a cancerous cervix. The author assisted him in the operation, which was most skilfully performed, and was present when the lady died, being summoned by him at the last moment. But with the Paquelin cautery we have made many high amputations of the cervix, and have not yet met with a secondary hemorrhage.

When the cancer has involved the vagina and the wall of the bladder or of the rectum is infiltrated, or when there is found to be involvement of the broad ligaments, the inference is legitimate that the lymphatics have also become infected, and all radical treatment is contraindicated. Unfortunately, the radical treatment applies to a very small percentage of the cases met with both in private and in hospital practice. The onset of the disease is so insidious that early symptoms are overlooked, hemorrhages are referred to the "change of life" or to irregularities of menstruation, and the patients present themselves at last for advice, with such extensive involvement that a brief respite from suffering and a short prolongation of their lives is all we can offer them. Our aim in these cases should be to check the wasting discharges and hemorrhages, and make the patients as comfortable as possible for the short time they have yet to live. The hemorrhages and discharges are best controlled through the removal of the ulcerating or vegetating cancerous masses by rapidly breaking them up with the fingers and scraping away the diseased tissue with a sharp spoon curette. In our opinion, the best curette has a serrated edge. It is of importance to bear in mind the position of the bladder and rectum in cases of extensive involvement, as the infiltrated walls of these organs are readily perforated, thus rendering, by rectal or vesical incontinence, the condition of the patient more uncomfortable than before interference. After sponging the cavity dry, the raw surface is seared with the button-shaped end of the Paquelin cautery heated to a dull cherry-red heat, and the wound tamponed with iodoform gauze. The dressing should be renewed in forty-eight hours, and the vagina douched with bichloride-of-mercury solution, 1 : 4000. After such treatment the patients gain rapidly in weight and strength. The improvement lasts usually from three to six months. In a few cases we have known the respite to last for several years.

The use of caustics applied on small tampons to the raw surface after curetting has been advised. Nitric acid, chromic acid, 5 per cent. solution of bromine, and saturated solution of chloride of zinc are the caustics usually employed. After their application the vagina should be protected by tampons wet in a saturated solution of sodium bicarbonate. In forty-eight hours the tampons are to be removed, and the parts dressed with iodoform gauze until the slough of the cauterized area separates. This usually takes place in from seven to ten days. The use of the Paquelin cautery seems, however, to meet every indication and to be attended with less discomfort to the patient.

The fetid discharges are best relieved by douches of permanganate-of-potash solution, 3 to 6 drachms to the quart, of peroxide-of-hydrogen and chloral solutions, or of suppositories of chloral and tannic acid, which on account of their irritant action must be used intermittently with the douches. Thymol solutions have also been recommended.

For the hemorrhages, which are seldom fatal, yet always weakening and alarming, it is best to use douches of very hot water or of very hot vinegar. If these fail, the vagina may be tamponed with pledgets of cotton wet in a saturated solution of alum. Should this fail to control the bleeding, some cotton, which has been soaked in Monsel's solution and dried, may be placed upon the cervix and secured by a gauze tampon. The use of Monsel's solution is seldom required, and should never be resorted to if it is possible to control the bleeding by other means. It produces dense coagula which are liable to occasion fresh hemorrhage in their subsequent removal, or, if allowed to stay, undergo decomposition and add to the patient's suffering.

To prevent erythematous eruptions from the discharges, the external genitals should be frequently cleansed with castile soap and warm water, washed with lead-water, and anointed with borated vaseline.

The patients, beside local treatment, require tonics and easily-digested food. The bowels are prone to become constipated, and require special care. The pain, though modified by local treatment, is distressing and demands the use of morphia. The withholding of opium from these sufferers is cruel in the extreme, and either the administration of some form of the drug by the mouth or the hypodermic use of morphia in whatever quantities required, is demanded in every case. They have but a few months to live; let these months be as comfortable as possible.

The attention of the profession has lately been called to the use of pyoktanin in the treatment of cancer. Methylene blue may be administered internally, and also externally to the cancer itself. Under its influence it has been claimed that the pains are relieved, the cachexia diminished, while the cancerous tissue breaks down and is discharged. Cures of advanced cases have been reported. The drug may well be tried in cases where the disease is too extensively developed for radical treatment. We have never ventured to administer it internally, but we have applied it externally to the ulcer without any benefit whatever; and, to tell the truth, we have no more confidence in it than in those obsolete remedies which once were so much vaunted—viz. Chian turpentine and condurango.

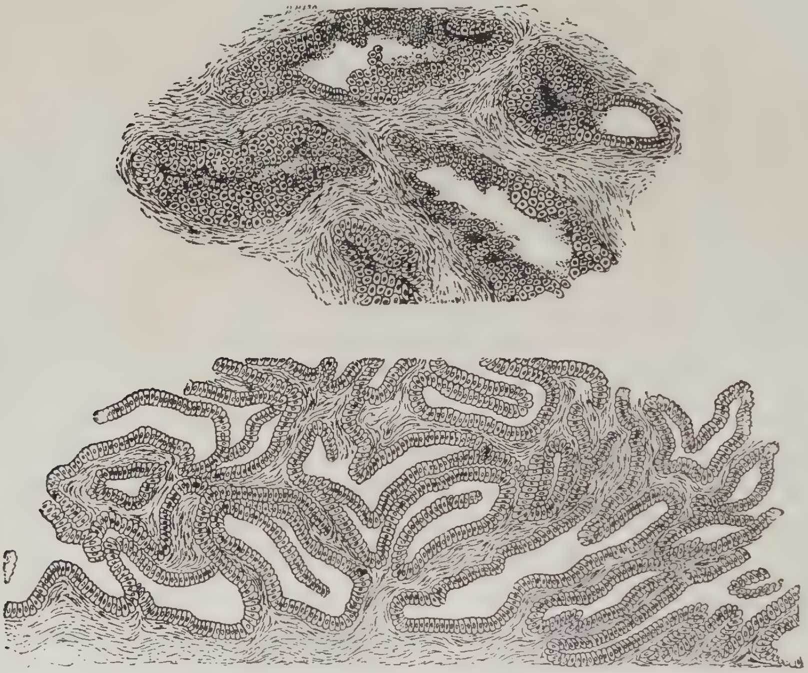
Carcinoma of the Body of the Uterus.

Carcinoma of the body of the uterus is less frequent than that of the cervix, and a more frequent condition than sarcoma. It is more a disease of advanced age than cervical carcinoma, and is rarely seen before the menopause. It may occur in nulliparous women, and is then usually found in sterile women who have passed the climacteric and in old maids.

The disease originates in the glandular element of the uterine mucous membrane, and may present itself as a polypoid degeneration of the endometrium or as a diffuse infiltration. It rapidly invades the deeper tissues, which become necrotic and are thrown off. From the rapid destruction of the uterine tissue the womb soon becomes converted into a crater-shaped carcinomatous mass. Adhesions form to the contiguous organs, and perforation may take place into the bladder and intestine or into the peritoneal cavity, thus causing rapidly fatal peritonitis. The disease extends into the tubes and involves the ovaries. Metastatic nodules in other more remote organs are frequent.

Symptoms.—The first symptom is hemorrhage. Later on there follows a copious watery discharge which may be purulent and offensive. The discharge may be bloody-serous in character and destitute of odor, and both hemorrhage and discharge may be wanting. The secretions are more fetid when softened carcinomatous nodules become loose in the uterine cavity and are expelled from it with bearing-down pains. The pain differs widely as a symptom. In many cases it is wholly wanting. The pains of carcinoma of the uterine body are similar to those accompanying other uterine tumors. Lumbar and sacral pains are complained of, and frequently violent pains in one or both lower extremities. Paroxysms of pain, recurring at certain hours of the day, are characteristic of carcinoma when present, but do not always accompany the disease. They resemble the pains of uterine colic, and are occasioned by the abnormal contents of the womb. Attempts of the womb to expel its contents occasion especially tormenting pain. Later, when the growth involves the serous covering, peritonitic pains are added.

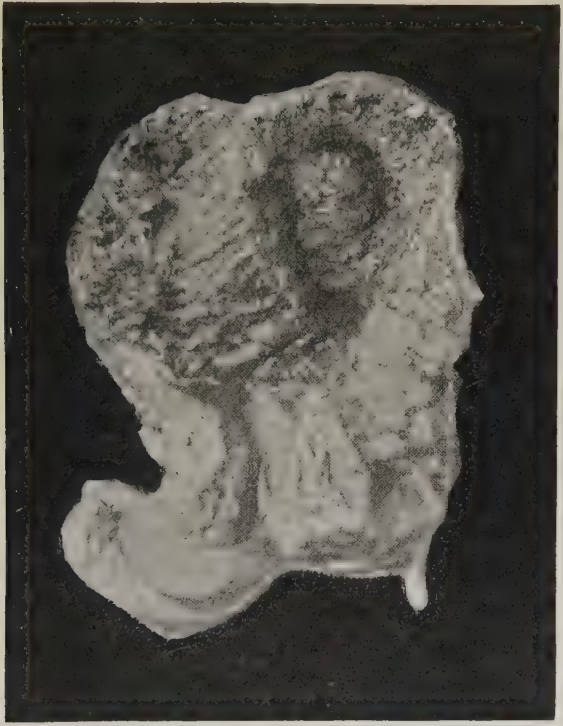
Fig. 268.



Malignant Adenoma of the Uterine Mucous Membrane, beginning glandular epithelioma.

On examination the uterus will be found uniformly enlarged. Later in the course of the disease metastatic nodules may be recognized as prominences upon its surface, or adhesions to neighboring organs render it no longer capable of being definitely outlined.

FIG. 269.



Carcinoma of the Body of the Uterus.

The enlargement is usually not extensive, and in the earlier stages it is barely recognizable. The cervix is occasionally patulous, or is readily dilatable by the examining finger, permitting the growth to be felt in the uterine cavity and pieces to be removed. It may be hollowed out by the invasion of the disease, forming with the uterus a large cavity.

The general health usually fails late in the course of the disease. Often extensive disease is found in well-nourished women. Three times has the author successfully removed the whole womb for this disease in women who were fat, ruddy, and the pictures of perfect health. In none of these cases was pain the prominent symptom, but repeated and very persistent dribblings of blood. In one case only was the hemorrhage even alarming.

The DIAGNOSIS of cancer of the body of the uterus often presents many difficulties. Where the uterus is regularly enlarged and there are no bad-smelling discharges, the case may easily be regarded as myoma, yet the attention will be attracted in many cases to the strikingly tense distension of the uterine walls occasioned by the rapidly-growing neoplasm. This condition recalls that of hematometra.

When a uterus, at first regularly enlarged, develops upon its surface one or more knob-like projections and forms adhesions to the neighboring organs, the indications are clearly of malignant growth. The diagnosis will be made then, however, too late for radical operation.

The whole clinical course of cancer of the uterus should excite suspicion. The return of irregular hemorrhages after menstruation has ceased, often for years, should arouse the suspicion of cancer if there are no polypi in the endometrium or cancer of the cervix to account for it. The eventual occurrence of bad-smelling discharges and the perceptible increase in the size of the womb will confirm the suspicion. On the introduction of the sound the irregularly degenerated surface of the growth may be felt, and frequently the sound, used without force, will penetrate the masses, and, indeed, perforate the womb, as happened once in our hands. These clinical symptoms are so clearly indicative of cancer that hardly a doubt should remain as to the diagnosis.

Microscopical examination of excised pieces should always be made. The pieces are removed at different positions of the growth with a sharp spoon. The operation is attended with neither suffering nor harm to the patient, and renders the diagnosis sure before the corroborative symptoms of the later stages have developed, which place the patient beyond the pale of operative interference.

Cancer of the womb, from a curative point of view, must be regarded in its incipient stage, before it has progressed to fixation. In the course of its advance the lymph-glands which lie behind the peritoneum of the posterior abdominal wall, and the lymphatics at the point of attachment of the ligamentum latum upon the abdominal parietes, are the first to become affected. The palpation of these glands is extremely difficult, if not impossible. So in cancer of the uterine body it can never be absolutely determined whether the radical operation will be attended with a return of the disease or not. It can be decided only that the performance of the operation is feasible. For this reason the prognosis in cancer of the body is perhaps less favorable than in that of the cervix. Yet, on the other hand, cancer of the body of the womb is slower in attacking peri-uterine structures.

The sole TREATMENT for cancer of the womb, wherever situated, whether in the neck or the body of the womb, before infiltration of the adjoining tissues has taken place, consists in the complete removal of that organ with its ovaries and tubes, either through the vagina or by the abdominal incision. When the womb is not much enlarged, vaginal hysterectomy should be our choice on account of the greater simplicity of the operation, the shorter time required for its performance, the greater comfort of the patients during their convalescence, and the avoidance of an unsightly scar and of the risk of subsequent ventral hernia, which frequently follows abdominal section. The womb may become so large, however, that its removal by the vagina is an impossibility. We have then, of necessity, to remove it from above through the abdominal incision or through the sacrum.

In uterine cancer, if the vagina is not implicated, if the disease has not travelled along into the broad ligaments, and if the womb has not been fixed by adhesions, the immediate and remote success attending the operation of the complete removal is an extremely satisfactory one. The averages of immediate and permanent recovery compete most successfully with those of the excision of the breast for cancer. Thus, out of 474 cases operated upon by five principal operators in Germany and collected by Winter, 40 died from the operation—a mortality of 8.4 per cent. Individual operators have done better than this: Kaltenbach having lost 3.3 per cent.; Leopold 4 out of 80 vaginal hysterectomies; and Stande 1 out of 22. On the other hand, of 778 cases of excision of the breast collected by Koester, the immediate mortality reached 15.6 per cent. Experience greatly lessens the rate of mortality in the extirpation of the womb. For instance: Péan lost 7 out of his first 22 cases, and none out of his next 16 cases.

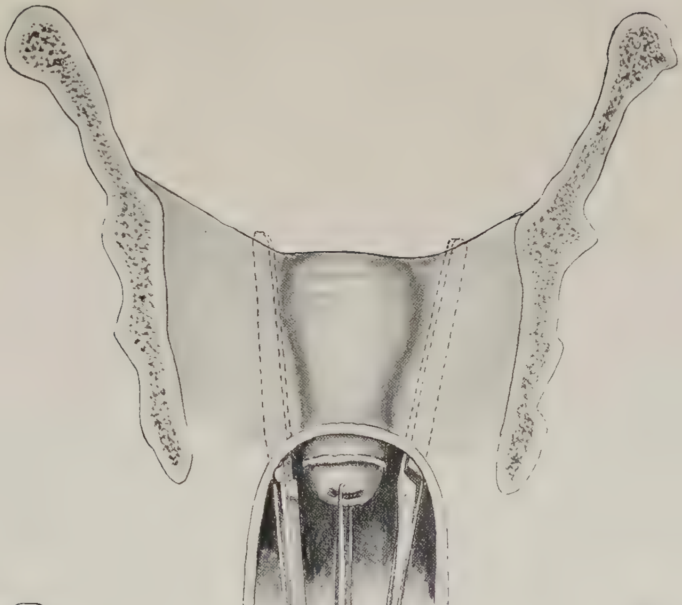
As regards permanent success, cancer of the breast is discovered earlier, and is therefore operated on earlier, while cancer of the womb is rarely discovered until it has so far advanced as to have insidiously implicated contiguous and continuous structures. Even when it is discovered, being seated in an unseen organ, its dangers are not realized and operative interference is liable to be postponed.

Hence one would infer a larger measure of permanent success in extirpation of a mammary cancer. Yet, from our own personal experience, and from a careful statistical inquiry into the experience of others, we are thoroughly convinced that the removal of the womb *per vaginam*, for cancer, far surpasses in its remote or permanent success, not only all other operations for cancer of the womb, but also all operations for cancer in other parts of the body. Nor need we wonder at this success, because the lip, breast, penis, and rectum, which are the favorite sites for cancer, are integral parts and parcels of the body, while the womb is to the body only an appendage, which is merely suspended by stays and guys, and these of a different or mongrel tissue.

We all know how liable cancer is to return in the breast even when discovered early and the whole mammary gland has been removed. Cancer of the lip or of the penis behaves no better, while cancer of the rectum always returns, no matter how early or how thorough has been the extirpation of that gut. On the other hand, let us consider the statistics of those gynecologists who have removed the womb for cancer. At the end of five years Fritsch had 36 per cent. of cures; Hoffmeier had no return after four years in 33 per cent. of his cases; at the end of two years Schauta of Prague found 47.3 per cent. of his patients free from the disease; Olshausen, after the same length of time, reports 19 out of 40 without a relapse. The careful statistics of the Dresden Klinik exhibit the following remarkable results: Of 80 patients examined over two years after the operation, 45 were without any recurrence; of 58 patients examined after three years, 58.6 per cent. were well; of 42 patients after four years, 59.5 per cent. were found free from the disease; of 30 after five years, 60 per cent; of 9 after six years, 66.6 per cent. had no return; whilst two women who had survived the operation seven years were perfectly well. The best showing, however, is by Leopold, who states that out of 76 of his cases remaining under observation after recovery, 72 were still well, without recurrence of the disease, from one to five and a half years after the operation. In view of these facts we are warranted—indeed, we are compelled by duty—to operate whenever we can do so safely in a case of cancer of the womb, and that by the complete extirpation of the whole womb. Every other operation aiming at the removal of only the diseased portion of the womb is a delusion and a snare.

PLATE XVIII.

FIG. 1.



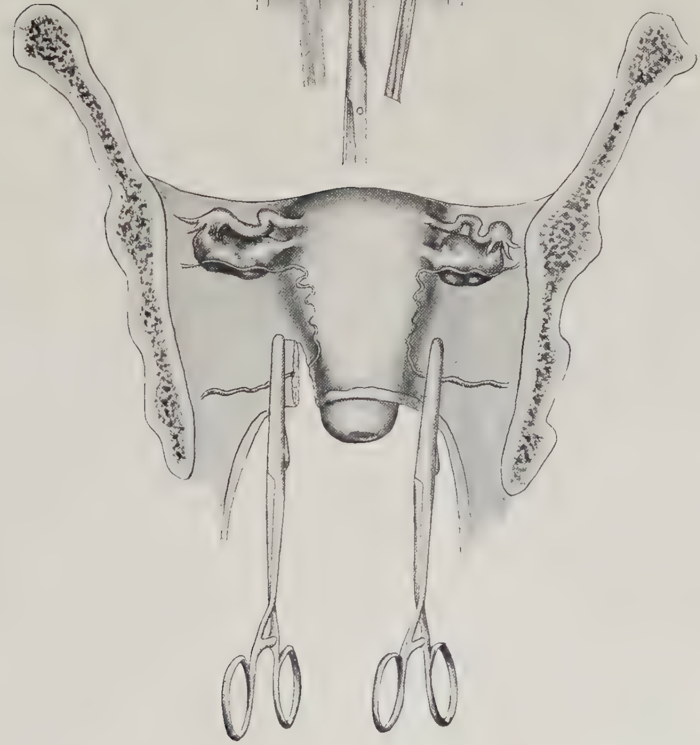


FIG. 2.

FIG. 1.—Vaginal Hysterectomy with Clamps. Single-clamp operation.
FIG. 2.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation : first step.

Whilst, undoubtedly, the general consent of gynecologists has fixed upon the vagina as the best channel through which the womb should be extirpated, whether for cancer or for incurable prolapse, yet the same unanimity does not exist with regard to the technique of the operation. Some surgeons, at the head of whom stand Péan and Richelot, secure the broad ligaments, either in section by several catch-forceps or as a whole by a single clamp on either side. Many, perhaps the majority of American surgeons, have adopted this mode of procedure, and there is hardly one who has not invented some form of clamp. This is usually a more rapid mode of operating, and the clamps are kept on only from thirty-six to forty-eight hours; but it has its objections. First, the ends of the clamps or the beaks of some of the forceps placed higher up must protrude into the peritoneal cavity of the pelvis, which therefore cannot, as in the operation by ligature, be closed above them so as to make the stumps extraperitoneal. Consequently, from the breaking down of the tissues in the bite of these instruments the pelvic and intestinal peritoneum is liable to be infected by putrilage. Especially will this happen when the bruised stumps, released from the weight of the clamp-forceps, spring back into the peritoneal cavity. Second, the large open channel between the abdomen and the vagina invites contamination of the contents of the former. Another objection is the possibility of the clamp catching one of the ureters in its bite. This unfortunate accident has repeatedly happened, and it is always a fatal one. Again, there is, after the use of the clamp, a liability of intestinal adhesion to the margin of the wound, causing fatal obstruction. This has happened so frequently as to make some operators return to the use of the ligature. Further, the obstruction of the vagina by the presence of such bulky instruments makes the removal of the distant tubes and ovaries difficult, if not in some cases impossible. Finally, the danger of fatal hemorrhage from the slipping off of the forceps is far greater than when ligatures are used. It is true that in those cases in which, by inflammatory exudation, the broad ligaments have become so shortened and so rigid as to make the application of ligatures very difficult, or indeed impossible, clamps and catch-forceps may be indispensable. But it is in precisely such cases that the operation of extirpation is, in our opinion, of questionable advantage. For usually such a condition of the broad ligament is brought about by the extension of the malignant disease, and not by a mere inflammatory exudation of a benign character. Nor, if caused merely by inflammation, are the immediate results so good as when the womb is freely movable.

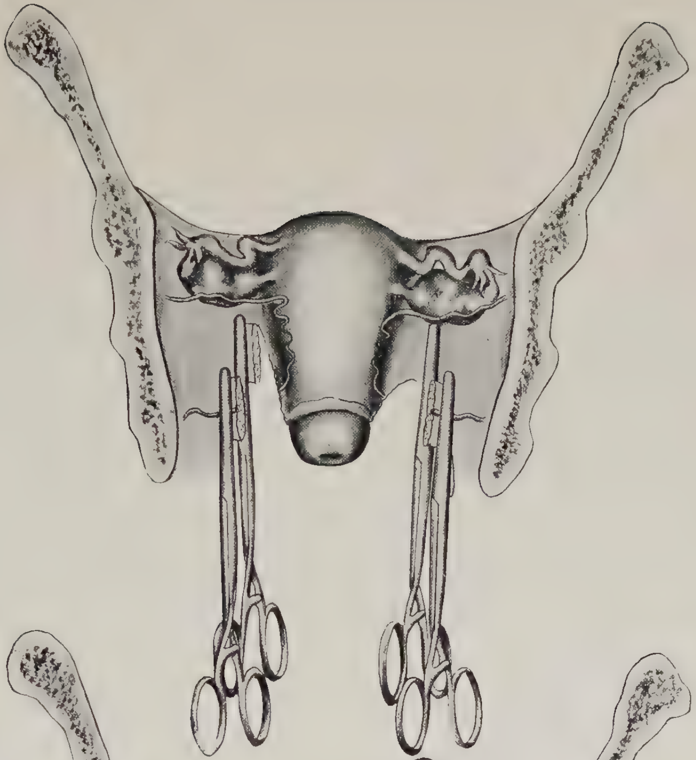
The objections to the progressive silk ligatures are less grave, and they are as follows: When applied to the short and dense stumps of the broad ligaments they are liable to slip off. Then, again, it is true that while by their use most of their knots and the included portions of the broad ligaments can be made extraperitoneal by closing the roof of the vagina above them, some of the knots of the upper ligatures will usually lie in the peritoneal cavity. Consequently, since one of each of the free extremities of the silk ligatures must not be cut off, but be left long in order to facilitate their ultimate removal, there will be a liability of capillary drainage along these ligatures from the unclean vagina into the peritoneal cavity. This invites blood-poisoning, or, what is not uncommon, local abscesses, because the knot, which may hang on for three, four, or even six weeks, as we have known it to stay on, becomes converted into a septic foreign body.

Now, catgut ligatures are not open to these objections. If applied directly from the alcoholic solution in which it is kept, and unmoistened by water, catgut swells up immediately, and binds more firmly than before the tissues around which it is tied. It is therefore less liable than silk to slip off. We have, indeed, never known a catgut ligature to slip off, even when applied to the short and thick broad ligaments of a fibroid tumor of the womb and to its very large blood-vessels, which have to be tied during the operation of suprapubic hysterectomy. Then, again, in vaginal hysterectomy the catgut ligature has this very great advantage over the silk ligature: that each ligature, high or low, intra- or extraperitoneal, can be cut off close to its knots. Hence those knots left in the abdominal cavity are not only absorbable, and therefore less likely to become foreign bodies, but by the sewing up of the wound in the vaginal roof, also by catgut, they are cut off from the vagina, and therefore from vaginal contamination. Lastly, all the ligatures will take care of themselves by absorption, and do not need, weeks after the operation, repeated vaginal examinations and repeated tugs before they can be dislodged.

The dangers of vaginal hysterectomy, however performed, are sepsis, hemorrhage, vesico-vaginal fistula, and injury to the ureters by the clamp or by the ligature. Therefore that surgeon who care-

PLATE XIX.

Fig. 3.



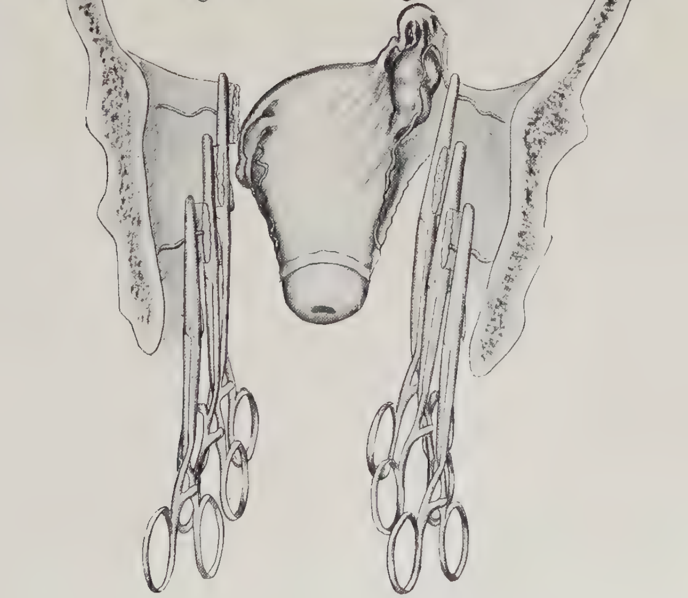


Fig. 4.

Fig. 3.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation: second step

Fig. 4.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation: third and final step.

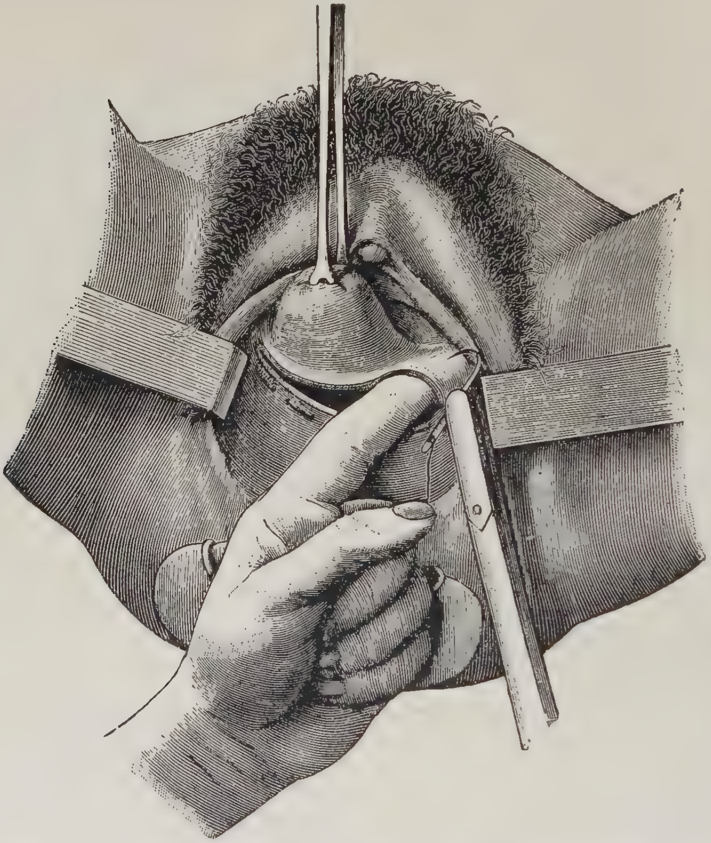
fully avoids these dangers will in the long run be the most successful.

The technique which we now prefer to follow is a blending of what seems to us to be the best points in Martin's and Olshausen's operation. The cervix is first thoroughly curetted, and afterward charred by Paquelin's thermo-cautery. The funnel-shaped excavation is next stuffed with iodoform gauze, and its lips are sewed closely together by a continuous suture. These precautions are taken to prevent contamination of the peritoneum from any uterine leakage. The vagina now gets a thorough cleansing with a soft-soap solution, and is swabbed out with a 1 : 1000 bichloride-of-mercury solution. The woman being placed in the lithotomy position, the parts are covered with a sterilized napkin having a slit corresponding to the vulvar orifice. Not to be short-handed, four assistants are needed : one to give the ether, one at each knee, and the fourth to be seated by the side of the operator in order to render him close and frequent help. The vagina being expanded by a short duck-bill speculum and by two retractors, the cervix is seized by a double tenaculum forceps, dragged downward and upward, and Douglas's pouch opened. Aided by the forefinger of the left hand introduced within the opening, a running suture of catgut unites the peritoneal edge of the incision to its vaginal edge; in other words, the rectal edge of the vaginal incision is whipped over. This is a very important procedure, both because it prevents the stripping off of the peritoneum during the subsequent manipulations, and especially because it prevents any hemorrhage, which is very likely to take place from this wound several hours after the operation. To protect the peritoneal cavity and to keep the intestines from protruding, a sponge or a roll of iodoform gauze, to which a strong thread is attached, is pushed up through the opening in Douglas's pouch. To distinguish this thread from the numerous other ligatures a small piece of gauze is tied to its free extremity. The cervix being now dragged backward and downward, a transverse incision is made across its anterior surface above the os uteri, beginning and ending at the first incision, and the bladder is stripped off with the finger, with the knife-handle, and with an occasional nick of the scissors until the utero-vesical fold of the peritoneum is reached and opened. Here also is the vesical edge of the vaginal incision whipped over with catgut, so that now the whole vaginal wound is secured against hemorrhage.

When the bladder has been stripped up off of the womb, and not before, lest the ureters should be included in the ligatures, the broad ligaments are tied off in the following manner:

By means of two aneurism needles, curved to the right and to the left, successive portions of the broad ligament on each side are tied with gut ligatures and cut off from the womb; but the free extremities of the ligatures are, for the time being, left uncut. As the womb is thus gradually freed, it descends lower and lower, until, all its attachments being severed, it is extirpated. Sometimes this can be greatly facilitated either by retroverting or by anteverting the womb, and by delivering its fundus respectively through the posterior or the anterior vaginal incision. This maneuvre is brought about by the fingers in the anterior opening pushing the fundus backward, or vice versâ. The fundus is then seized and drawn out by the

Fig. 270.



Vaginal Hysterectomy: Opening the posterior cul-de-sac, and suturing the peritoneum and the mucous membrane together to control bleeding.

tenaculum forceps, or it is hooked out by the old-fashioned obstetric crotchet. By this forward or this backward displacement, as the case may be, the broad ligaments get a half twist upon themselves, which not only reduces their width by one-half, thus lessening the number of ligatures needed, but which also places their upper and more distant portions within easy operative reach. Whenever possible, the ovaries and tubes should also be ligated and removed, because these organs, being the next ones most liable to be attacked, may already contain cancer-germs, and because the woman should not be subjected to the annoyance of the now needless function of menstruation.

When the womb has been extirpated the sponge or the gauze tampon is removed, the free extremities of all the ligatures on the left broad ligament are seized with the left hand, and the stump on that side is drawn below the level of the opening in the vaginal roof. To keep it in this position it is sewed by one or two catgut sutures to the corresponding end of the incision. The same thing is done to the right stump, and all the ligatures—if of catgut—are cut off close to their knots. We ought to have said that before this is done the ligatures—say those on the tube and ovary—lying too high to be made extraperitoneal are first cut off close to their knots. A strip of iodoform gauze for drainage purposes is now pushed up into the pelvic cavity through a small opening left in the vaginal roof, and the vagina is loosely packed with iodoform gauze. On the third day the bowels are moved, and after that both strips of the iodoform gauze—the drainage strip and the vaginal tampon—are removed. No kind of vaginal douche should be used for a week, and then only with great gentleness for fear of tearing open the newly-united parts.

There are some excellent surgeons who prefer to close up wholly the vaginal wound, and to use no kind of drainage whatever. In unquestionably clean operations this plan is, in our opinion, warrantable. But since the vagina is an unclean canal, and the disease itself is septic to the last degree, one can never be sure that one's operation has been free from infection. Hence in the long run it seems to us that drainage would be safer, and we have very generally resorted to it.

When the vulva and vagina are ample and the womb is not much enlarged, this operation is usually an easy one. But when opposite conditions exist, such as may be found in aged women, and especially in old maids, the operation is a very difficult one. It may then demand vulvo-vaginal incisions to increase the working room, or it may have to be completed by a final resort to abdominal section.

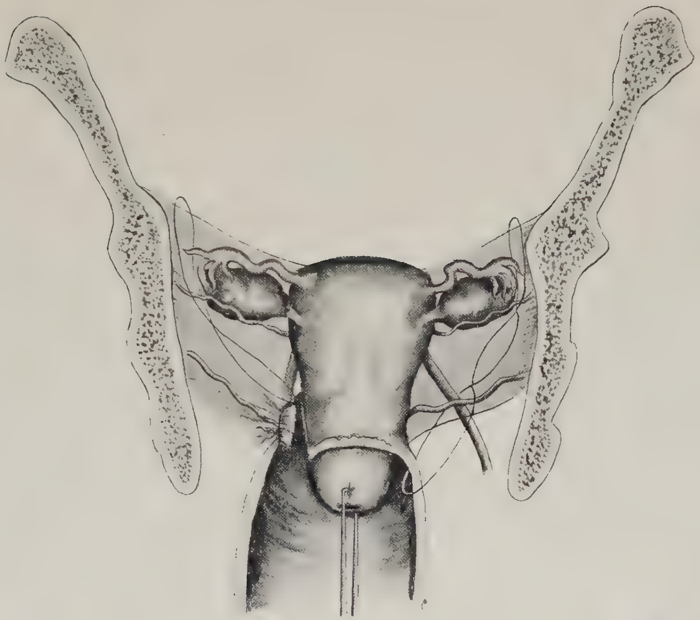
For the first twenty-four hours after the operation nothing whatever should be given to the patient excepting sips of hot water or of hot weak tea without sugar or milk, and for flatus an occasional teaspoonful of old whiskey; but even these should be given sparingly. After that time tablespoonful doses of milk, of beef-tea, or of barley-water may be given every two hours. This diet may then be increased after the bowels have been moved. If during the first twenty-four hours nourishment seems indispensable, or if, later on, more nourishment than that given by the mouth is needed, resort should be made to enemata of peptonized milk or of beef-tea with whiskey. The convalescence in these cases is usually remarkably prompt, so much so as always to surprise one, although now the author has had a pretty large experience with them. The absence of all constitutional disturbance, the freedom from pain, and the ability of the patient to turn from side to side at will are in striking contrast to the ordinary features of an abdominal section.

Sometimes, as has been intimated, on account of the size of the diseased womb or of the narrowness of the vagina, or of uterine adhesions situated so high that they cannot be reached from below, the womb may have to be removed by an abdominal section. This operation will be described elsewhere, and its details are therefore not given here. Yet it will not be out of place to remark that in such cases it is often well to begin the operation *per vaginam*, and to end it by cœliotomy. Of course the most scrupulous antiseptic precautions must be taken, because the risk of infecting the peritoneal cavity is now greatly enhanced. Trendelenberg's position is the one best suited for this abdominal section, as it permits every step of the operation to be readily seen.

Attempts have been made to remove the uterus through other avenues of approach; thus hysterectomy has been performed through a transverse incision in the perineum, the recto-vaginal septum being divided. Methods have been devised for entering the abdomen through incisions to the right or to the left of the coccyx, extending from the sacro-coccygeal articulation, curving slightly outward to a point two or three centimetres from the fourchette. Through either of these incisions the operator reaches the

PLATE XX.

FIG. 1.



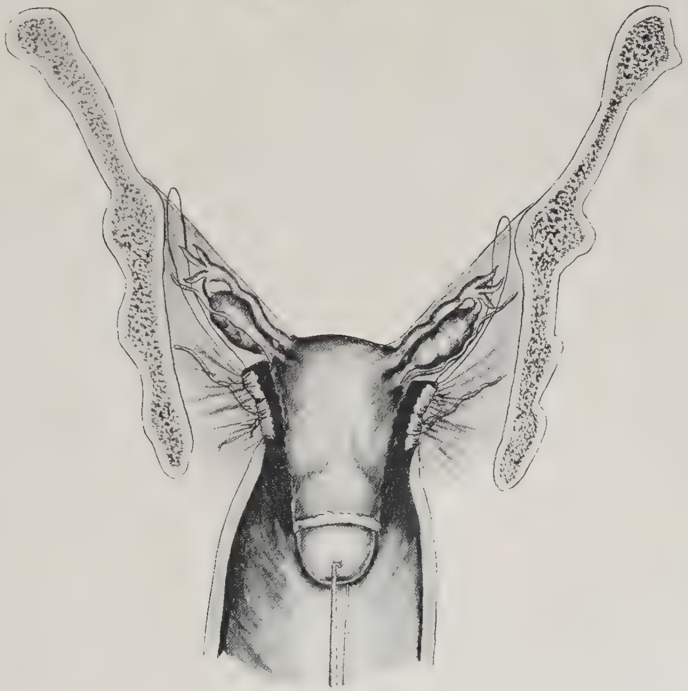


FIG. 2.

FIG. 1.--Vaginal Hysterectomy with the Ligature : first step.
FIG. 2.—Vaginal Hysterectomy with the Ligature : second step.

ischio-rectal fossa. A part of the gluteus maximus is resected, the sacro-sciatic ligaments and the levator ani muscles are cut through, and the rectum is detached from the vagina. The vaginal cul-de-sacs are then opened and the hysterectomy performed. The operation by the sacral method, devised by Kraske, is of all these methods the best, as it is the easiest of execution and affords the largest opening for manipulation. The patient is placed in the right lateral decubitus, and after preliminary antiseptic preparation of the parts and the plugging of the rectum with antiseptic gauze, a curved incision is made on the left side of the coccyx, extending from its tip to the middle of the sacro-iliac symphysis. The periosteum covering the coccyx is stripped off and the coccyx extirpated. The lower portion of the sacrum, up to the lower border of the third sacral foramen, is removed by cutting forceps. The distended rectum is easily recognized and displaced laterally. The peritoneum in Douglas's pouch is now picked up and incised, and the abdominal cavity opened for the hysterectomy, which is performed in the same manner as in the vaginal operation. The principal accident which may occur in the performance of this operation is the wounding of the rectum or the severing of one of the ureters. Should the first occur, it should be immediately closed by a running suture with fine catgut. A ureter if severed, provided the ends cannot be reunited by sutures, should be turned into the rectum or into a near coil of intestine, while the end attached to the bladder should be ligated and closed. It would probably be better to remove the corresponding kidney at once, as the subsequent trouble with the bowels, induced by the pressure of the urine, would most probably necessitate this step at a more or less remote period. On account of the extensive separation of the tissues it is well in closing the wound to provide for drainage. This method provides for the removal of uteri too large to be excised through the vagina. The operation through the abdominal incision is, however, in every respect preferable.

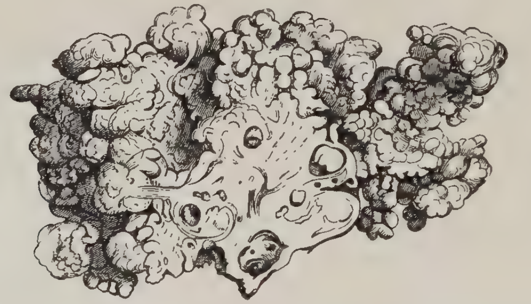
Cancer of the Ovary.

Carcinoma of the ovary is usually secondary to a carcinoma of the womb or of some other organ. Primary ovarian cancer may occur, however, and appears to have no relation with the age of the individual. It has been observed before puberty. Usually both ovaries are involved.

Primary ovarian carcinoma appears in two forms—as a diffuse cancerous infiltration of the ovarian stroma, or as a tumor growing from the periphery of the organ.

In the first form the ovary is usually uniformly converted into a cancerous mass, preserving its form, although it may reach an enormous size. Ovarian cancers of this class have been observed as large as a man's head. Rarely, several cancerous masses may form in the ovarian tissue, which, growing rapidly, give rise to an irregularly shaped tumor.

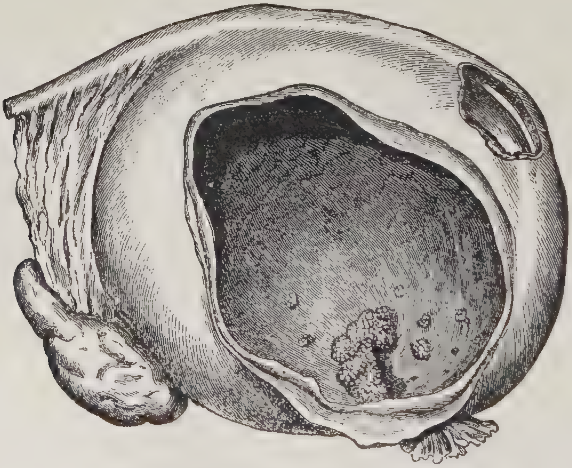
Fig. 271.



Section of an Ovary, showing its surface covered with papillomata.

In the second form of ovarian carcinoma the growth forms a cauliflower-shaped mass which projects from the surface of the ovary. It consists of a papillary proliferation rich in blood-vessels and covered with cylinder epithelium. This form of carcinoma of the ovary leads early to ascites and to the infection of the perito-

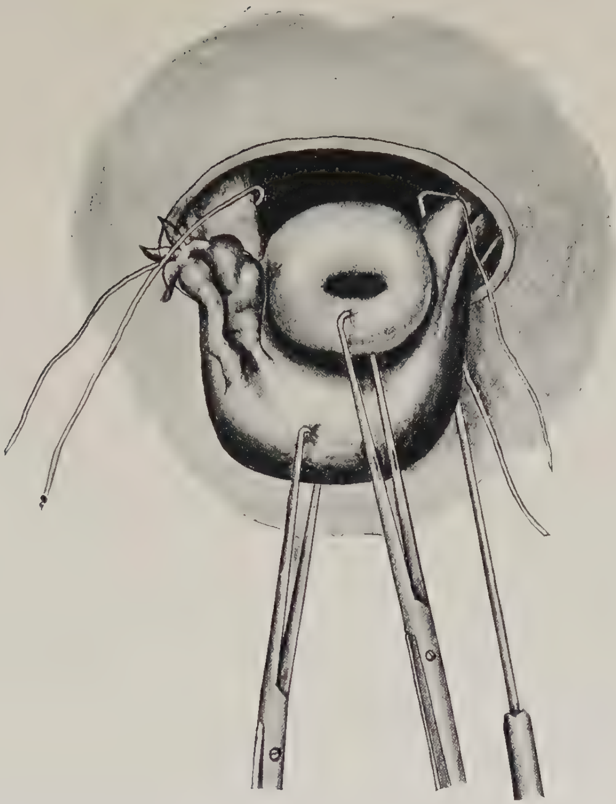
Fig. 272.



Papillomatous Cystic Tumor of the Ovary.

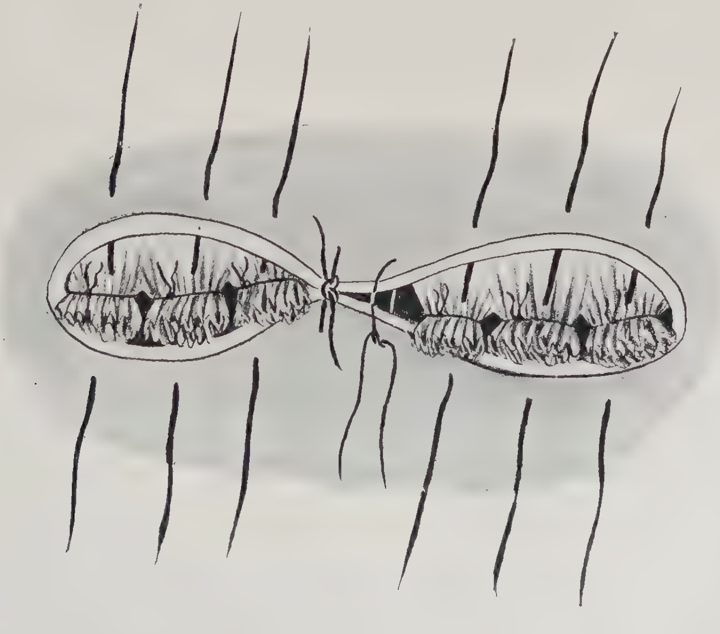
PLATE XXI.

Fig. 3.



Vaginal Hysterectomy with the Ligature: third step. Fundus dragged into vagina prior to placing final ligature.

Fig. 4.



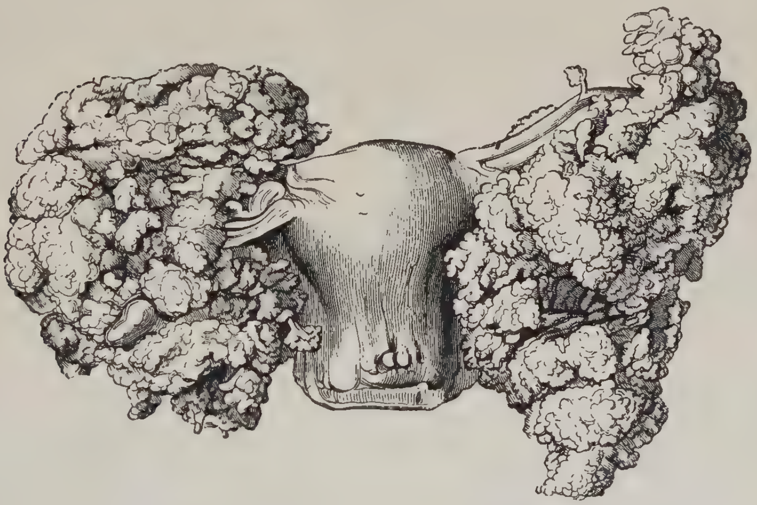
Vaginal Hysterectomy with the Ligature: stumps drawn into the vagina, with sutures in place ready to close the opening in the vaginal vault.

neum. Small papillary growths form on the peritoneal surface, soon becoming carcinomatous.

Of much more frequent occurrence is the cancerous degeneration of cystomata of the ovary. These appear either as the epitheliomatous form, having its origin in the papillary proliferation of a cystoma, rapidly leading to infection of the peritoneum and to ascites, or as a pure glandular type of carcinoma forming in the tissue of the ovarian cystoma.

The ovarian carcinoma soon excites profuse ascites and chronic peritonitis from its irritation of the peritoneum. It spreads rapidly by circumscribed nodular formation to the neighboring organs, and through the broad ligament to the pelvic connective tissue. It may perforate the covering tissues of the ovary, and proliferate, fungus-like, in the cavity of the pelvis. The epitheliomata infect the peritoneum much earlier.

Fig. 273.



Papillcmatous Disease of the Broad Ligaments, completely hiding the appendages.

The primary symptoms do not differ from those of benign enlargements of the ovary. The tumor grows, however, more rapidly. Symptoms of chronic peritonitis exist. A symptom of much diagnostic importance is the early œdema of the feet and ankles from pressure upon the great vessels of the pelvis. The condition of the patient continues to grow worse until death occurs from peritonitis, marasmus, stricture of the bowel, or from uremia.

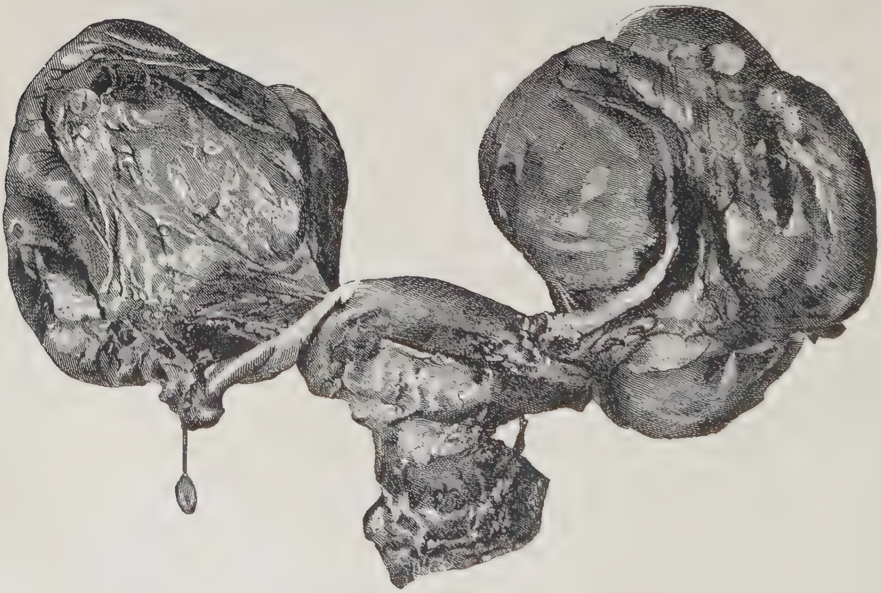
The marked distension of the abdomen from ascitic fluid usually first causes the patient to seek advice. Soft, compressible masses in Douglas's pouch may then be felt. It is usually necessary to draw off the ascitic fluid by a small median incision or by tapping in order to make an absolutely certain diagnosis. The relaxed abdominal walls then permit an easy examination of the pelvic organs, and the irregularly-enlarged ovary or cauliflower-growth may be clearly detected if the process has not progressed so far as to involve the entire pelvis and render the ovary a highly probable point of origin.

The TREATMENT instituted depends upon whether secondary involvement of the peritoneum has taken place. If this has not occurred, ovariotomy should be performed at once. Frequently, after opening the abdomen, the operator will find, to his disappointment, the impossibility of complete removal. If the infiltrated base of the growth is to be felt extending into the pelvic cellular tissue, or nodules are found in Douglas's cul-de-sac, the operation should be abandoned, as attempts at removal of the growth would only hasten the end.

SARCOMA OF THE OVARY.

Sarcoma of the ovary is of rare occurrence.. It is usually of the spindle-cell variety and affects both ovaries. It has been observed

FIG. 274.



Sarcoma of both Ovaries.

in girls eight years of age. The growth develops from connective tissue of the ovarian stroma, which normally contains short spindle-shaped cells. Sarcomatous tissue is frequently found in dermoid cysts, and growths resembling sarcoma microscopically often follow their removal. The spindle-cell ovarian sarcoma is attended with considerable vascular development, which gives the growth a cavernous appearance. The Graafian follicles may become dropsical, and, increasing rapidly in size, produce a cystic complication of the sarcoma.

The sarcomatous tumor preserves the shape of the ovary, and may reach a considerable size. Tumors of this kind have been reported weighing eighty pounds.

The DIAGNOSIS is difficult. A large solid ovarian tumor is easily recognized. Such a growth is probably sarcomatous if of rapid growth, possessing a smooth surface, and attended with ascites, especially if the patient be young and both ovaries be tumefied.

The TREATMENT is wholly surgical. Sarcomata of the ovary do not rapidly involve the neighboring tissues, nor do they give rise to early metastasis. After removal they are not so prone to return as the carcinomata. Still, one is not sure of complete cure by extirpation even in the most favorably appearing cases. The author has had perfect cures from the removal of the cyst; then, again, he has seen the disease return very soon; but in one case it did not return for five years, during which time the woman enjoyed good health.

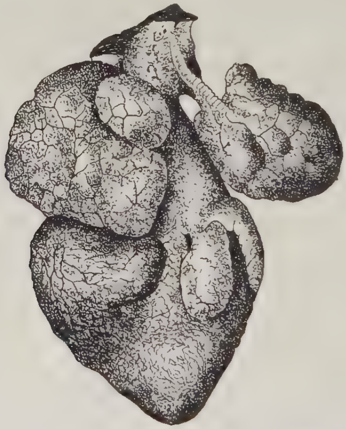
UTERINE NEOPLASMS.

Fibroid Polypi.

Cervical.—These are always more or less pedunculated, generally with slender stems. True fibroid polypi arising from the cervix are not common. More generally is it the case that cervical polypi are of glandular origin.

As in the illustration, the gross appearances of the growths where they contain much fibrous tissue, strongly resemble malignant disease, and the diagnosis may rest entirely on the microscopic appearances.

Fig. 275.

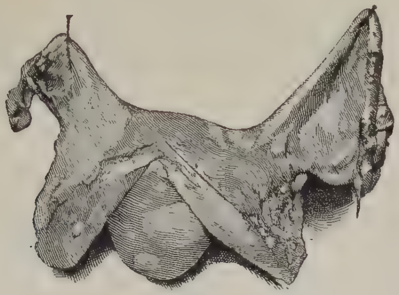


Small Muriform Polyp of the Cervix (papillary fibroma with glandular hypertrophy).

Cervical polypi, being exposed to the vaginal filth, usually produce a nasty, purulent discharge, profuse and ill-smelling. There is always more or less general glandular endocervicitis with them, the cervix being as a rule widely gaping and eroded. They do not reach a large size. If the pedicle be long and the mass hang entirely outside the cervix, strangulation may occur in the growth and a spontaneous cure ensue.

Uterine.—These are merely transitional between the mucous polypi already described and submucous fibroids. They are described by many authors as the result of the uterine contractions forcing the submucous fibroids into a pedunculated form—an attempt at spontaneous cure. The uterus being in a condition of chronic metritis is always more or less enlarged, and its cavity is distended. Purulent endometritis is a common accompaniment, and general glandular hypertrophy is usually present.

FIG. 276.



Intra-uterine Fibroid Polyp.

Some of these polypi have short stems, but their pedicles may be so long as to cause the bulb of the polypus to hang from the vulva. Unlike the glandular variety, fibroid polypi are usually single.

SYMPTOMS.—These are very similar to those occasioned by small, submucous fibroids. There are pronounced uterine cramps, purulent discharge, increased menstruation, hemorrhage, backache, and a sense of weight in the pelvis, as common symptoms. The discharge is profuse generally, and the bleeding is marked. There may be a continuous oozing all the time, or the bleeding may occur as hemorrhages, very profuse and alarming. Fibroid polypi are not easily mistaken for other growths when once seen and felt.

TREATMENT.—Fibroid polypi are not amenable to medical treatment. Pedunculated fibroid polypi from the cervix may readily be removed by torsion. Should the base be firm or broad, it may be severed with the scalpel and a few sutures taken to correct the hemorrhage and approximate the cut surfaces.

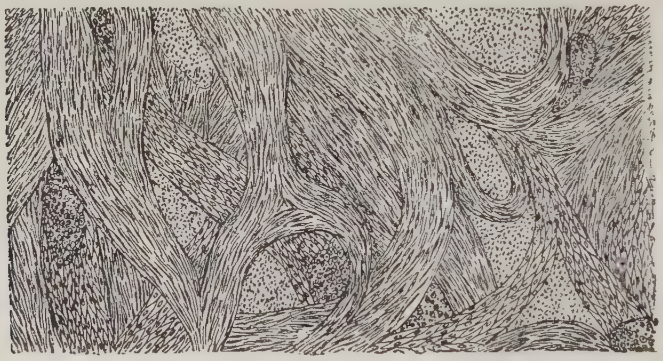
Small polypi from the body of the uterus may also be removed by torsion, but it is better to combine with this curettage and gauze packing if the general endometrium be, as it usually is, much hypertrophied.

Large polypi are occasionally quite formidable affairs. In case the finger cannot be introduced into the vagina at all, owing to the size of the growth, it is proper to cut away enough tumor to enable the passage of the finger and stout forceps. The pedicle is sought for and secured by forceps, when the growth is to be cut away. The pedicle may be twisted or sutured. As these growths are unclean, irrigation and gauze dressings are indicated. It must not be forgotten that in old women malignant disease is apt to supervene upon any long-standing inflammatory condition of the inside of the uterus. Therefore it is always well to submit the curettings and the polypus to the microscopist for examination.

UTERINE FIBROIDS.

PATHOLOGY.—Uterine fibroids are composed of an increased growth in the fibrous and muscular structures of the organ; they are generally, then, fibro-myomata. They are non-malignant tumors, but not infrequently is malignant disease associated with existing fibroid. They may occur just beneath the uterine mucous membrane, or deeper in its walls, or immediately under the peritoneum. They are then known as submucous, interstitial, or subserous. They are prone to occur in nests or groups, and the several varieties are very often associated; precise classification in such a case is not possible. In gross appearances these tumors are of a deep red color or pale. They are firm, and under the knife cut like gristle when the fibrous tissue predominates, but are less firm when the muscular fibres are in excess. Upon section the striations of bundles of fibre may be seen, and nests of fibrous tissue bulge from the cut surfaces as nodules. Their walls may

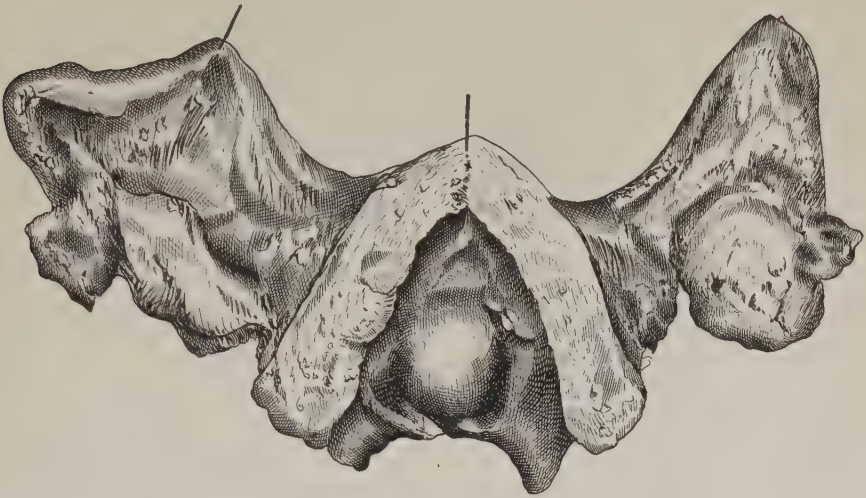
FIG. 277.



Uterine Fibro-myoma, microscopic view.

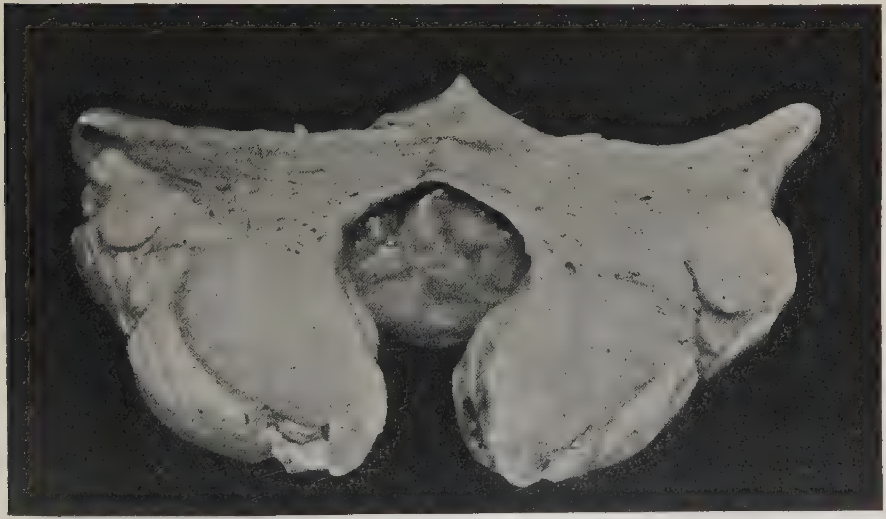
contain cysts filled with clear, bloody, or purulent fluid. They are prone to undergo various degenerative processes—cystic, myxomatous, fatty, and even calcareous degeneration. There are two forms of cystic degeneration—one due to myxomatous changes; the other, more common, due to lymphangiectasis—distension of the intermuscular lymph-spaces.

Fig. 278.



Submucous Uterine Fibroma.

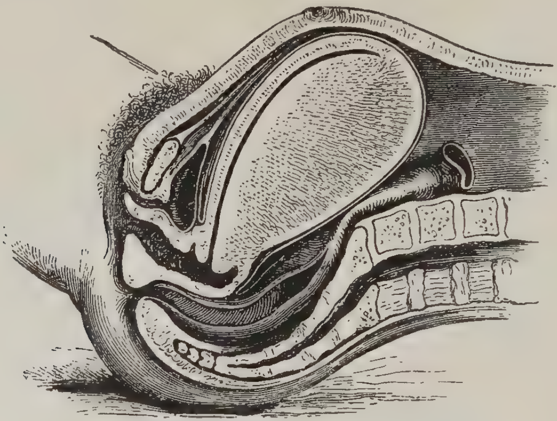
Fig. 279.



Submucous Fibroid Tumor of the Uterus: the uterus is laid open, showing the fibroid cut in two; also cavity of the uterus.

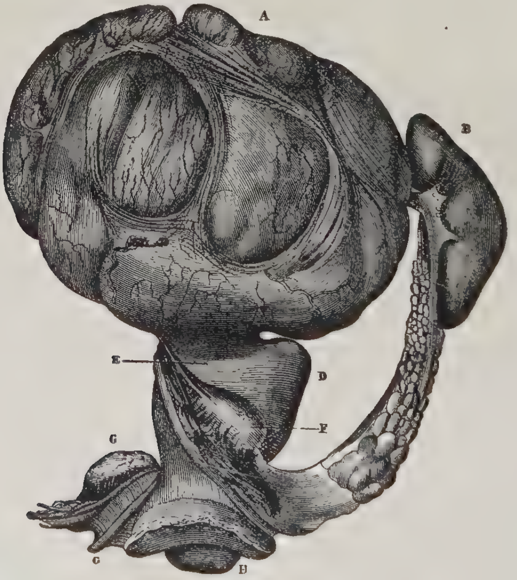
Fibroid and fibro-cystic tumors occur of any size, from that of a pea to the largest, weighing one hundred and ninety-five pounds, removed by Severanu. They arise from any part of the body of the uterus, and less frequently also from below the os internum. Large subserous tumors are covered with enormous veins, and all fibroids are generously supplied with blood. According to size and locality,

Fig. 280.



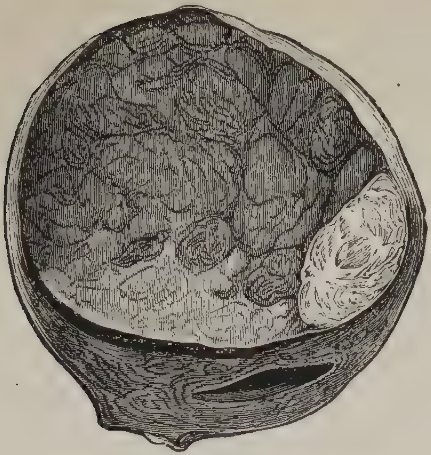
Large Fibrous Interstitial Tumor of the Uterus.

Fig. 281.



A, Subperitoneal Pediculated Fibroid; *B*, left kidney; *C*, Wolffian cyst; *D*, interstitial fibroid contained in the right cornu of the uterus; *E*, insertion of the peduncle of the large tumor on a level with the left cornu; *F*, left ovary and round ligament; *G*, right ovary and round ligament; *H*, cervix.

FIG. 282.

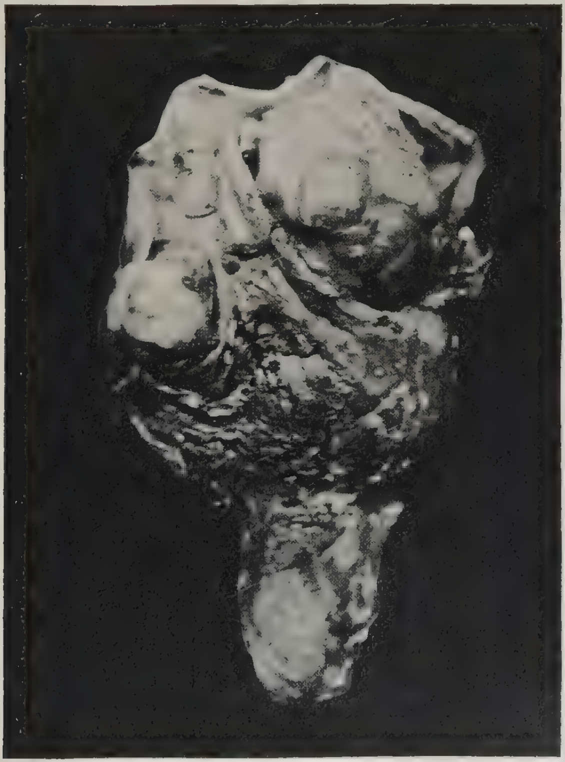


Interstitial Fibroid.

they may form attachments to almost any of the abdominal organs. Pedunculated fibroids from torsion of the pedicle may slough.

In addition to the above degenerative changes, fibroids may

FIG. 283.

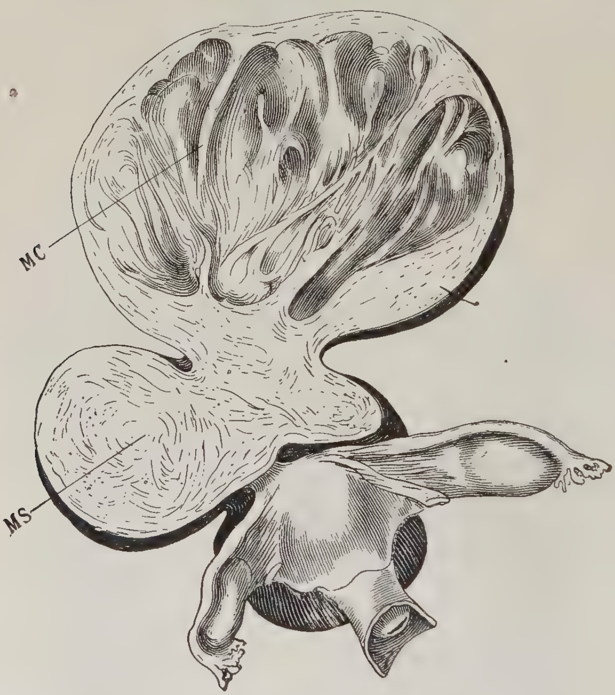


Calcareous Degeneration of Fibroma, showing the calcareous nodules.

become infected and undergo inflammation, with the production of pus, or even become gangrenous. Finally, the mucosa of the fibroid uterus may become epitheliomatous, or the connective tissue may be infiltrated with sarcomatous elements; and it is not uncommon to find cancer of the cervix coexisting with fibroid of the body. The cell-proliferation arises from the adventitia of the arteries, and the tendency to it is probably congenital.

Wyder has shown that there is nearly always an endometritis of a glandular, hypertrophic character, associated with fibroid.

Fig. 284.



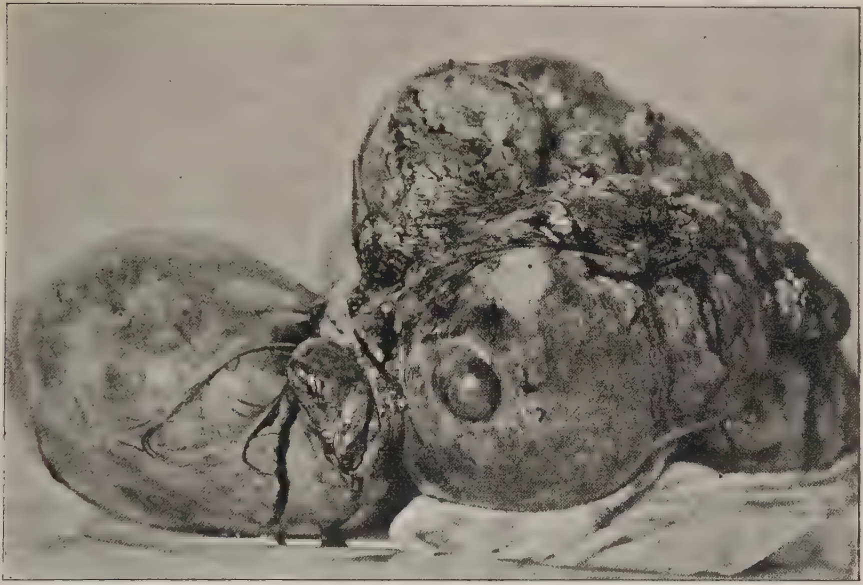
Pediculated Fibroid with Abdominal Evolution: *MS*, fibroid lobe; *MC*, fibro-cystic lobe.

The Fallopian tubes are the seat of interstitial change also, and may contain bloody or purulent fluid, and the ovaries are usually enlarged, with thickened capsules.

Various interstitial changes are produced in the important viscera, chiefly by obstruction to the vascular circulation, as fatty liver and nephritis. Large tumors are also associated with conservative hypertrophy of the left heart. There are two forms of heart degeneration, which are quite common in advanced cases, and known as brown and fatty degeneration. Fibroids occur before middle life as a rule, and have even been noticed before puberty.

More or less peritonitis is to be found in connection with the large tumors, binding them to the viscera. The omentum especially is prone to become attached to them, thus lending to the growths a new and increased blood-supply. Large blister-like accumulations of serum often occur just under the peritoneum adjacent to the sides of the large tumors, and more or less ascites accompanies them.

Fig. 285.



Enlarged Blood-vessels on the Surface of a Multinodular Subserous Fibroid Tumor of Uterus.

Symptoms.—Some fibroids, even of considerable size, give rise to no symptoms at all for some time, the patient merely noticing increase in her girth. Symptoms are due to the situation rather than to the size of the tumor. Subserous tumors give rise to pressure-symptoms chiefly, while hemorrhage is the most marked symptom of the submucous and interstitial varieties. But one subject may present all the various forms.

Pain.—This is very marked where the tumor causes a general distension of the uterine walls. Like all uterine pains, it is productive of hysterical symptoms. There are other pains, paroxysmal and from contraction of the uterine muscle, due to the irritating presence of the tumor. Local pain is less commonly attendant upon the subserous variety. The greater the tension in the uterine walls, the more severe is the pain. Thus it frequently happens that there is less pain where the growth has become large and thus escaped from the control of the uterine muscle.

Tumors of size growing from any part of the uterus cause pain from pressure on the nerves and adjacent organs. These pains radiate down the thighs and through the bladder and bowels from obstructed function in those viscera. Pressure-pains are most marked with tumors which are yet in the true pelvis. When the uterus and neoplasm have risen above the brim of the pelvis, they have a greater range of mobility. Menstruation and other bleedings increase the pains markedly in some cases.

Hemorrhage.—The menstruation first begins to be increased in amount. After a while the flow is extended in time for a few days, and an observing patient will appreciate that she is using more napkins at each successive period. Soon intermenstrual bleedings occur, and at such irregular intervals that the patient will lose all record of menstruation. She will be free from hemorrhage for weeks, and then have a bleeding which will bring her to death's door. This hemorrhage is produced from the hypertrophied endometrium, which often is in a condition of general polypoid degeneration, but there may be profuse bleeding with a membrane which is atrophic. Vessels which in the normal endometrium are mere capillaries become here thin-walled arterioles. These bleedings are often the first symptoms of mural and submucous fibroids, even of those of small size. Subserous growths may attain considerable size before giving rise to marked bleeding. The occurrence of the menopause has a favorable effect upon these growths, but it often never occurs, and is always postponed by the tumor. Again, most tumors begin to produce marked symptoms at a time when the menopause should naturally occur. Moreover, the menopause may merely check the bleeding for a time, it recurring after a few years.

Alternating with the hemorrhages is a leucorrhea. This may be a simple whitish discharge, or sanious or purulent according to the changes in the endometrium. It is frequently chylous, profuse, and particularly exhausting to the patient.

Pressure-symptoms.—Tumors lying in the true pelvis obstruct the rectum, thereby producing retention of feces even for many days at a time, and inducing a form of systemic poisoning by the re-absorption of excreta—"retention toxicosis." Also, as a result of this pressure, hemorrhoids are of common occurrence. The action of the bladder is interfered with by pressure on the urethra, producing thereby painful and difficult urination, with, ultimately, cystitis from retention.

The presence of large fibroids so obstructs the return flow of blood from the legs that there is necessarily a compensating enlargement of the veins of the abdomen. The ureters may be so obstructed as to produce hydronephrosis, and ultimately interstitial change in these glands, with albuminuria. Dropsy of the legs may occur from pressure alone, independently of kidney change.

General Symptoms.—As a result of the repeated hemorrhages these patients are exsanguinated to a considerable degree. In some the bleedings are sudden and fierce. These suffer from attacks of syncope. In others there is a continuous dribble, with occasional floodings, and they present the worst appearance of all, inasmuch as there is no interval during which recuperation may occur. Many of them are in very good flesh, some even fat. But those who have large tumors are emaciated from locking up of the emunctories and loss of appetite.

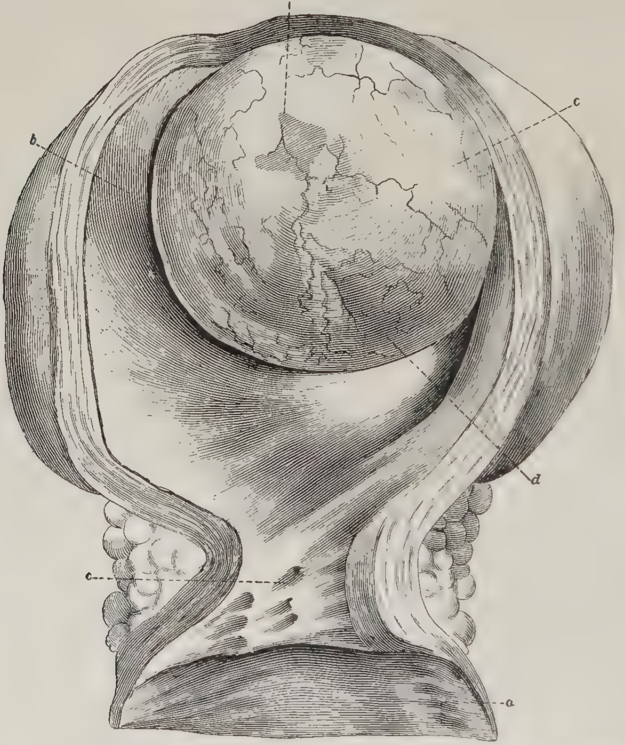
In large tumors producing pressure on the intestines there are the symptoms of anorexia, costiveness, foul breath, headache, and sometimes vomiting. Even in cases where there is no suppuration in the tumor, there may be rise in temperature; but, as a rule, febrile manifestations are indicative of degenerative changes, with production of septic material either in tumor or viscera.

Death from fibroid occurs either from asthenia, due to the continuous loss of blood and pressure, or some complication, and even from sudden profuse hemorrhage.

DIAGNOSIS.—A. *Submucous Fibro-myoma.*—The hemorrhages are especially severe, and first attract the patient's attention. Irregular uterine colic is also frequent. If the tumor is large enough to fill the pelvis, all the symptoms due to pressure are present.

Examination is most satisfactory. The uterine canal is increased in depth. Rectal and abdominal palpation show the organ to be enlarged in all its diameters, and reveal its shape. Intra-uterine palpation is perfectly safe, and may be performed by one of two methods. That of Vulliet, by packing the uterine cavity each day with successively increasing pledgets of iodoform gauze, is efficacious, free from danger, but painful and slow. Failing to dilate the cervix sufficiently for intra-uterine examination by Vulliet's method, incision of the cervix and forcible dilatation are to be employed. Dilatation being of sufficient extent, the finger of one hand is introduced into the uterus, while the other supports the fundus above. The submucous fibroid will be found to have made for itself a depression on that wall opposite its origin, and the tumor will be felt as a smooth, rounded body. The examination finished, the uterus is irrigated and a light drain of gauze introduced. If it has been determined to remove the tumor by enucleation at a subsequent day, or if there be too free hemorrhage, the uterus should be tightly packed with iodoform gauze. In this way the cervix will be kept open for future treatment. These submucous myomata are sessile, and never pedunculated.

Fig. 286.



Œdematous Submucous Fibroid: *a*, portion of the vagina; *b*, cavity of the uterus; *c*, tumor lodged in the cavity of the uterus, covered by mucous membrane (*d*); *e*, tumor rising above the surface of the cavity.

B. *Interstitial Fibro-myoma.*—Frequently a small tumor is accompanied by a general fibroid enlargement of the uterus, giving rise to the most severe symptoms, and yet the nodule projects into neither uterine nor pelvic cavity. The diagnosis here is difficult, and with the enlarged uterus the symptoms point equally to carcinoma; therefore a curettage for diagnostic purposes is proper, as it enables the microscope to differentiate absolutely between the hypertrophic endometritis of myoma and the cell-proliferation of cancer. The shades of difference between aggravated hypertrophic endometritis, with enlargement of the muscularis as a sequence, and general hypertrophy of the muscular walls, with a small interstitial myoma and thickened bleeding endometrium as sequences, are very slight. The chief point in distinction is the exact amount of uterine enlargement. Examination under narcosis, aided by the microscopical investigation of pieces removed by the curette, should determine the question. At least it will enable us to eliminate cancerous and tubal disease.

Where the interstitial fibroids are large, increased depth of the uterine cavity, general enlargement of the uterus, and more or less irregularity in its contour, either exterior or on the mucous coat, will suffice to make the diagnosis plain. These tumors when large produce hemorrhage, expulsion pains, and hysterical manifestations, in addition to pressure-symptoms.

C. *Subserous Fibro-myoma.*—These tumors are usually multinodular, and present a great diversity in arrangement. They may be sessile or pedunculated. The sessile tumors must be considered according to whether they extend between the layers of a broad ligament, into the bladder or into the pelvic cavity.

The diagnosis of sessile subserous fibroids projecting free into the peritoneal cavity is easy, the nodule being readily felt upon bimanual examination and rectal touch. At the same time, other conditions are easily excluded.

If the sessile fibroid grows from the anterior surface of the uterus and displaces the bladder, the uterus is usually retroflexed. The finger in the rectum may be made to feel the division between the uterus and fibroid, or the hand above the pubes may. But not always is this sulcus present, and the entire history and surroundings must be critically considered in order that an accurate diagnosis may be made.

Intra-ligamentous fibroids are exceedingly puzzling. They simulate ovarian cysts, broad ligament disease, extra-uterine pregnancy, and tubal cysts. Those which project into the broad ligament from the side are not especially difficult of diagnosis. They are more firm than other tumors in this locality, and the depression above and below between tumor and uterus may be felt. There is not the tenderness which accompanies tubal disease, and there is more mobility. Ovarian tumor, for many reasons, may be excluded. Extra-uterine pregnancy which has lasted a few months, especially if preceded by menorrhagia, is not easily differentiated from fibroid, for it has the same tense walls of fibroid. Although there is severe pain, yet it is not as lancinating as that of extra-uterine gestation, and is not followed by collapse, as is the latter. The pains of fibroid come on gradually, whereas the extra-uterine pregnancy first attracts attention by the sudden onset of the stabbing pain from the first attempt at tubal abortion. There is great difficulty in making the diagnosis sometimes, so similar are the histories of the two conditions. All fluid accumulations fluctuate, and are thus excluded.

When the sessile intra-ligamentous tumor grows down against the floor of the pelvis, it exercises violent and painful pressure upon the structures passing under it. The uterus is lifted up and immovable. The tumor is not only sessile, but also attached to the pelvic floor. Here rectal touch is especially valuable. The cervix is often so drawn upon for tissue as to be a mere ending to the vagina and cul-de-sac. So firmly attached to the pelvis are these growths that they seem to spring from the pelvic fascia. Enchondromata and fibromata of the pelvic floor have none of the general symptoms which intra-ligamentous tumors produce, and may thus be rejected.

Dermoid cysts under examination may suggest fibroid, but the subjective symptoms of the two conditions will suffice to differentiate.

Pedunculated subserous tumors float free in the abdomen with long pedicles, or are joined to the uterus by a shorter and more firm bond.

Œdematous tumors simulate ovarian cysts, but the fluctuating portions of the fibroid are limited, and there are parts of the tumor which demonstrate its character. The diagnosis is often utterly impossible. Unless the pedicle be very long and slender, the cervix grasped with the volsella and drawn down communicates at once its motion to the tumor; with dermoids and other hard cysts it does not. The area of displacement of fibroid is below the pelvic brim, that of floating kidney above. Splenic tumors arise from the splenic area and may be traced to their origin. Cancerous and tubercular omental disease displaces the stomach downward, and there is no area of resonance save at the hypogastrium. The growth is more rapid than in fibroids, and hemorrhage is wanting.

Many large fibroid and fibro-cystic tumors never give rise to hemorrhages, and the first and sole symptom may be the presence of the tumor. This is especially true of the fibro-cystic tumors, they causing, compared with the true fibro-myoma, but little bleeding. They have taken some time to grow, and coils of intestine are commonly in front of them, giving a tympanitic percussion-note. Almost invariably the cavity of the uterus is increased in depth, and rectal touch at least will demonstrate the attachment of the tumor to the uterus.

Treatment.—Sometimes tumors are accidentally discovered, produce no symptoms, and never give rise to conditions requiring treatment. They remain innocent during all the woman's life.

The treatment may be divided into non-operative and operative. In the former class we shall mention but two methods of treating these growths—by the use of ergot and by electricity.

Ergot Treatment.—The ergot is used both hypodermically and by the mouth, and is employed in every form of the tumor—in subserous fibroid for the purpose of causing shrinking, and in interstitial and submucous growths not only to cause diminution in size, but also, possibly, to cause expulsion of the growth *per vias naturales.*

Squibbs's aqueous extract (ergotin), dissolved 1 part to 10 of water, and 1 grain of salicylic acid added to each half-ounce of solution, the whole sterilized, may be employed with a hypodermic syringe kept for that purpose. The syringe also should be carefully sterilized before each application.

Beginning with 1 grain a day, the dosage may be gradually increased, the uterine pain governing largely the amount used. The same preparation may be used in pill form associated with nux vomica or strychnia. Where the tumor is submucous and interstitial large doses of ergot produce sudden and severe uterine colic; not so much impression is made, however, upon pedunculated fibroids. The depressing action of ergot upon the heart should not be forgotten, and for that reason it is wise to use strychnia at the same time. It is better to use a moderate dose continuously with weekly increases than to give enormous doses and intermit. Thus, if a patient receives internally 3 grains of ergotin a day and

1 grain hypodermically one day in the week, she should take enough to cause marked effect upon the uterine muscle.

There can be no question as to the effect of the drug. The most careful observers are unanimous in testifying that it not only relieves symptoms, but in all cases reduces the tumor, and a number of cases are reported of the voiding of tumors under its use. There is but little danger in its use, and we have been able to find only two cases which died while undergoing this treatment. Hydrastis canadensis is also highly spoken of as a substitute for ergot, in doses of 20 minims of the fluid extract, three times a day.

Ergot has no effect upon the fluid contents of fibro-cysts.

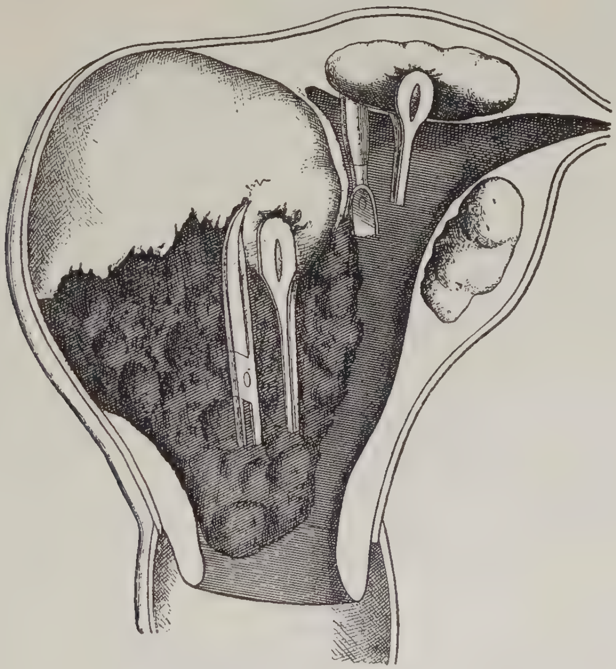
Electricity.—The electrical treatment of fibroids is so technical, and requires such an assortment of instruments and batteries, that information on the manner of using it will be left to special works on the subject. Different authors give different instructions as to the strength of the current: they range from 15 milliampères to 250, or even more. The pain produced by the strong currents is excessive. As to the results of the procedure, the latest figures are given by Vineberg, gathered from the works of Keith, Engelmann, Gautier, and others who are particularly skilled in the method. There were 372 cases: 9 cured, 5 died. This is 2.4 + per cent. cured and 1.3 + per cent. died—too high a ratio of mortality and too low a ratio of cures. The percentage of cures about represents the possible percentage of errors in diagnosis. There is another certain percentage not mentioned here, but which is, under careful investigation, growing. We refer to malignant disease associated with fibro-myoma. Electricity is admittedly not applicable to any form of cystic fibroma.

Altogether, the method must be considered purely experimental. The above results are certainly not flattering. Surely better results have been obtained from the use of ergot, and infinitely better from the removal of the uterine appendages, with about the same rate of mortality. In all cases where the physician feels he would not care to attack these growths radically, in view of the poor results at the hands of those who are masters of the method, we would certainly recommend the use of ergot or hydrastis to the exclusion of electricity, supplemented also by curettage in cases with severe hemorrhage, the results on both the tumor and general economy being excellent.

The treatment of fibroids by galvano-puncture is no longer practised to any extent, and is to be condemned in an uncompromising manner.

Surgical Treatment.—Vaginal Enucleation.—This operation is applicable to tumors which may pass the pelvic outlet or those not larger than the fetal head. The method is limited to growths which are strictly submucous or covered by only a small quantity of muscular tissue. The cervix is to be dilated by daily packing with gauze, and at the time of operation its calibre may be still more increased by incisions and forcible dilatation. The operation is preferably done in the dorsal position. The patient should be prepared as for a hysterectomy. If there be not room enough, the uterine artery may easily be ligated (see Vaginal Hysterectomy), and the cervix split to the vaginal junction. The tumor being located, its capsule is seized with a bullet forceps and split with a scalpel from above downward. A blunt-pointed curved scissors is then used to loosen the capsule from the circumference of the tumor. The excess of capsule is then cut off with scissors. The tumor is now seized with the forceps, and attempts made to dig it out of its bed with the blunt scissors, the point being turned toward the tumor.

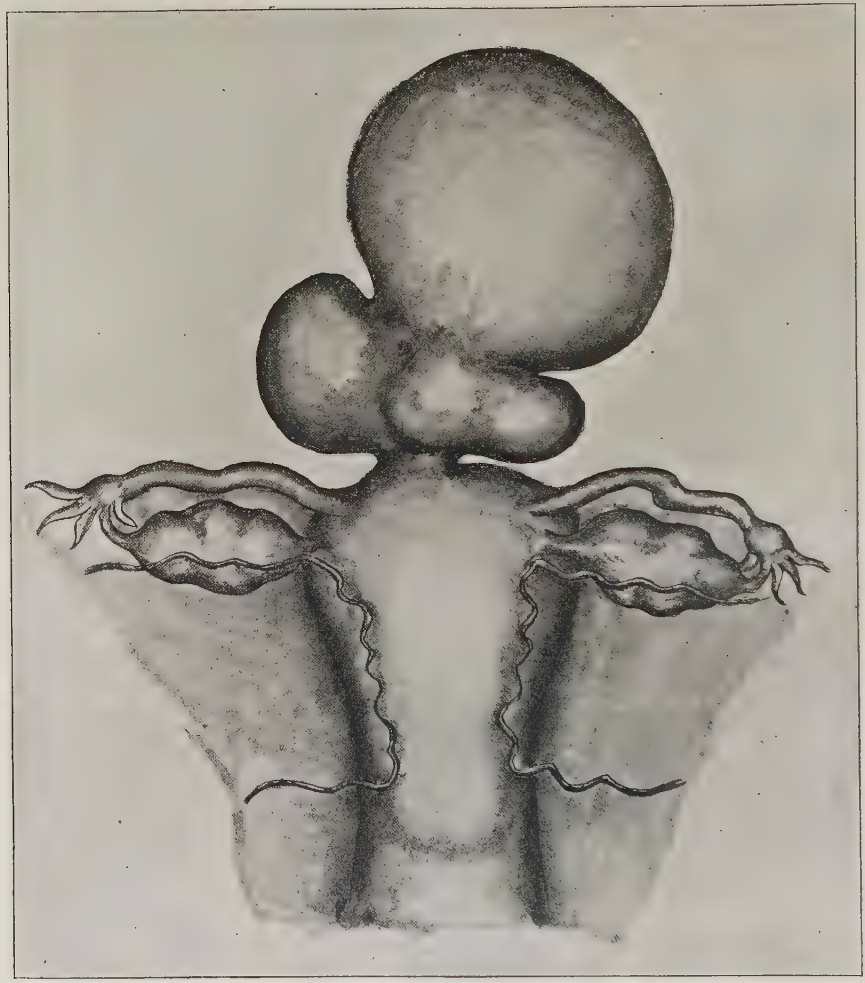
FIG. 287.



Removal of Fibroma by Morcellation.

In this way, alternately snipping connecting fibres and using either the closed scissors or an enucleator, but all the time applying firm traction on the tumor, it may be loosened from its bed, with the exception of a few fibres. It is then seized with a pair of strong forceps or hysterectomy volsella and twisted off. If the mass will not pass the cervix, it may be split. All loose shreds of tissue and capsule should be cut away, the finger introduced to see how much damage has been done, and the uterus washed out and packed with iodoform gauze. The hemorrhage is best controlled by the packing. The great danger from this operation has heretofore been sepsis, a thing we can now avoid. Even perforation of the uterus is not espe-

Fig. 288.

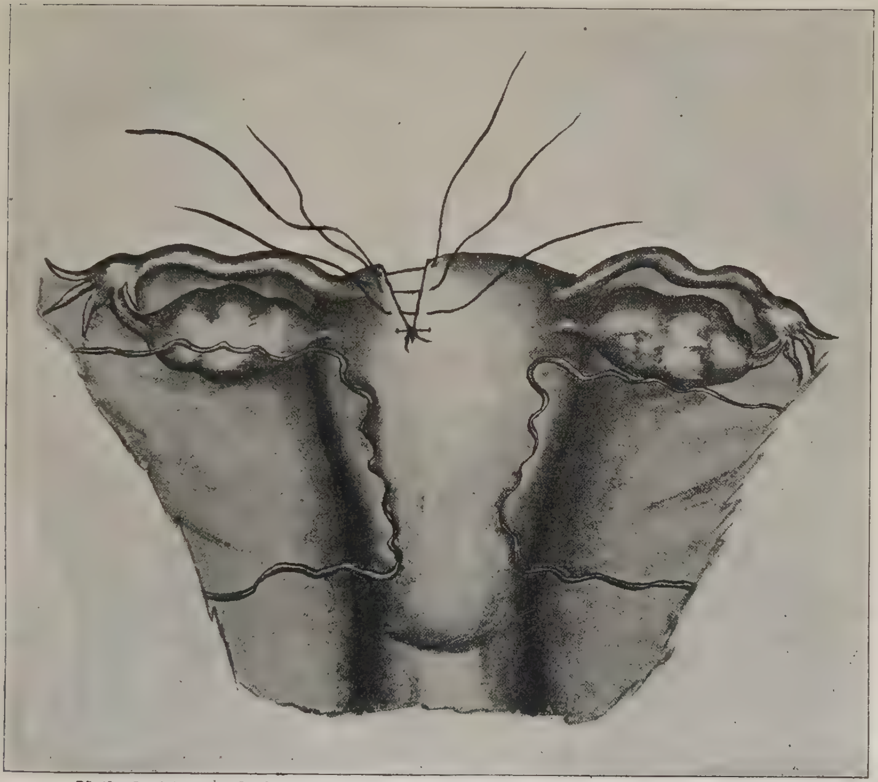


Subperitoneal Nodular Fibroid Tumor of the Uterus.

cially dangerous. Many tumors now removed by hysterectomy are amenable to this procedure. The after-treatment consists of the administration, hypodermically, of ergotin, frequent irrigation, and gauze packing invariably instead of drainage tubing. Most tumors formerly subjected to this operation are now preferably extirpated from above.

Applicable to tumors of the submucous and interstitial variety, morcellation will never occupy a place in surgery. It essentially involves incomplete perineal removal of the growths by forceps, scissors, and knife, after severe preliminary incisions in cervix and uterus.

Fig. 289.



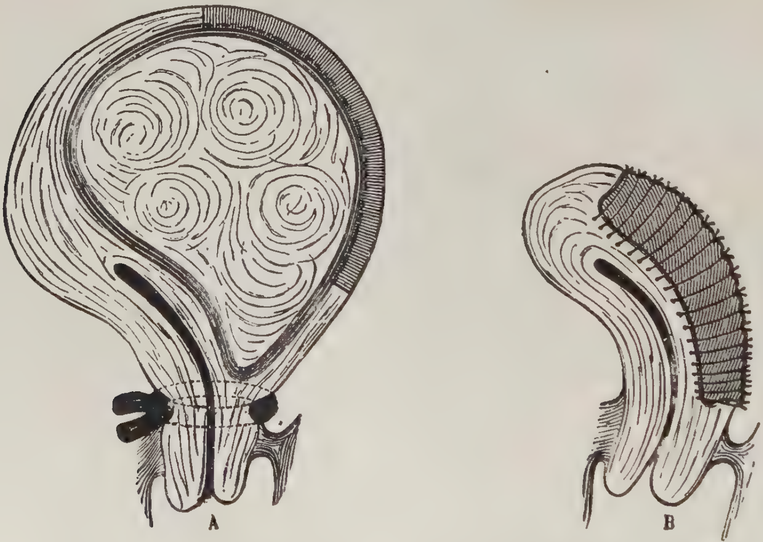
Method of Removal of a Subserous Uterine Fibroid, stitches in place ready for tying.

Small interstitial fibroids may be removed by total vaginal hysterectomy, the operation being similar to that for cancer. The operation is indicated when the mass is very small, gives great pain, produces profuse bleeding, or is septic. Cœliotomy is, however, preferable.

Myomectomy.—It will occasionally happen that the fibroid is attached to the uterus by a pedicle so small as to warrant removal of the tumor from above with the saving of the uterus. The pedicle is subjected to a V-shaped incision and the tumor removed. Sutures of heavy silkworm-gut or silk are then used to accurately unite the sides of the pedicle. If there is complete control of the bleeding without the appearance of strangulation by the sutures, the uterus is returned and the abdomen closed. Large pedunculated fibroids with stout pedicles must be treated differently. An elastic ligature or écraseur is thrown around the pedicle a little distance from the uterus, and the tumor cut away. The pedicle is then brought up into the wound, transfixed with stout pedicle needles, and the wound accurately closed around the stump, thus treating the stump extra-peritoneally. (See Hysterectomy.)

A. Martin has connected his name with the operation of enucleation of interstitial fibroids by the abdomen. He removes the tumor in a bloodless way by using a temporary elastic ligature, and depends upon his sutures to permanently control bleeding. He reports 16 cases—the uterine cavity opened in 10, and 5 deaths. It does not appear that anything is gained by this operation, and the mortality is high.

Fig. 290.



A, Enucleation of an Interstitial Myoma; B, Disposition of Sutures after Enucleation.

Supravaginal Hysterectomy.—*Extra-peritoneal Method.*—This

PLATE XXII.

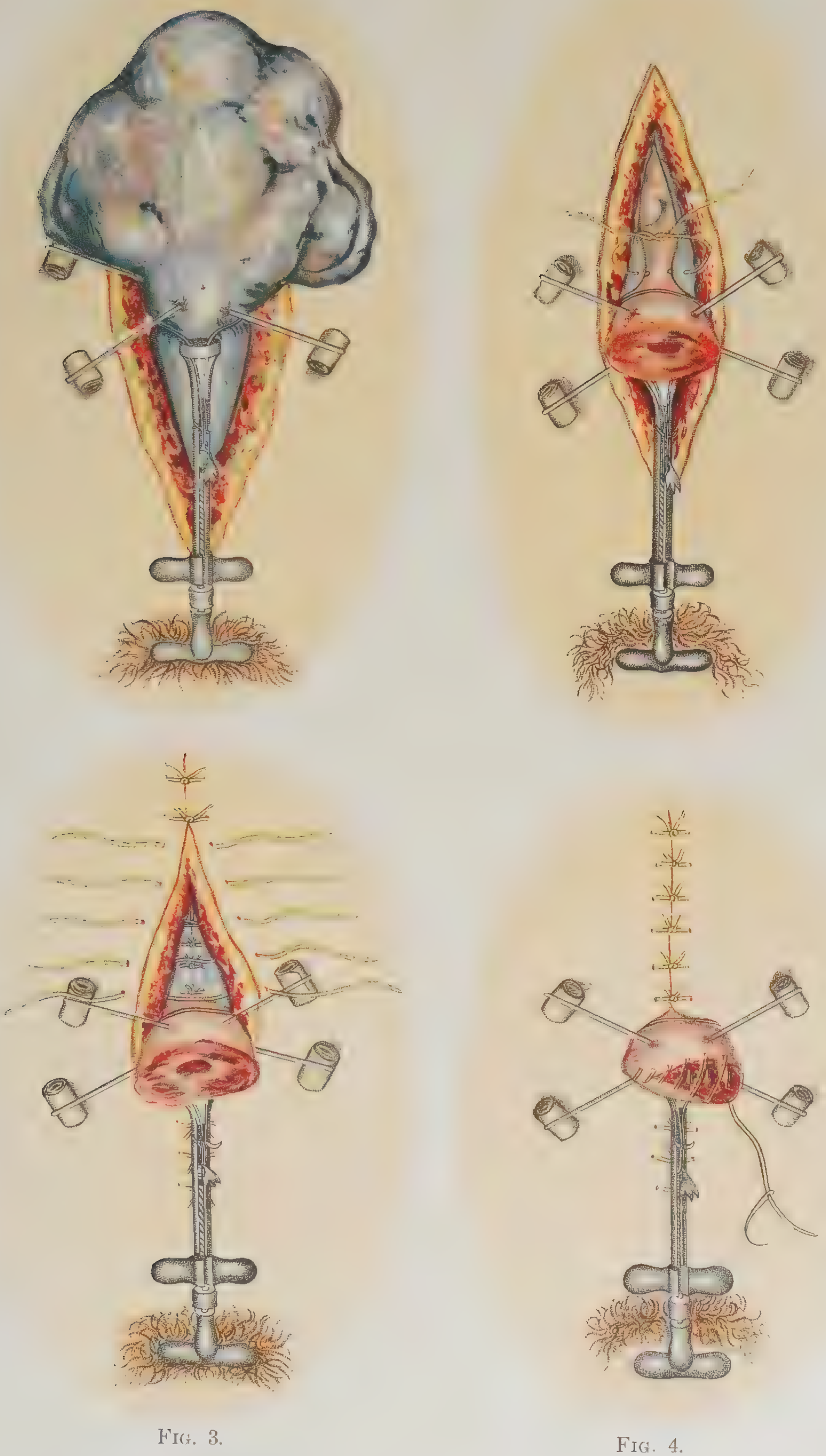


Fig. 1.

Fig. 2.

Fig. 3.

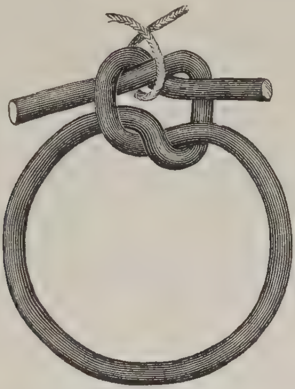
Fig. 4.

EXTRA-PERITONEAL TREATMENT OF THE STUMP AFTER SUPRA-VAGINAL HYSTERECTOMY.

Fig. 1.—Transfixion pins and serre-nœud in place prior to removal of tumor.
Fig. 2.—Abdominal peritoneum stitched to peritoneum of stump below wire.
Fig. 3.—Peritoneum closed; abdominal stitches in place.
Fig. 4.—Abdominal wound closed; stump in process of closure.

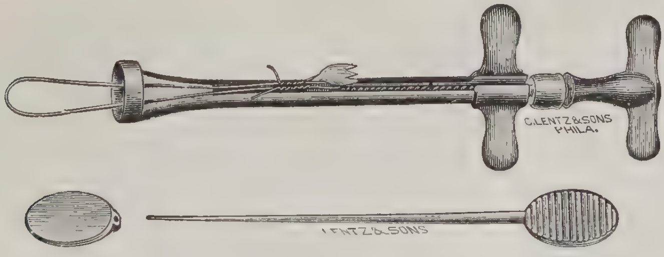
necessitates the treatment of the stump extra-peritoneally. The abdomen is opened and the uterus and tumor are turned out through the incision. If necessary to accomplish this, the broad ligaments are ligated between two ligatures and a rubber ligature drawn taut, or an écraseur is applied around the neck of the uterus. In fastening the rubber ligature one knot is tied, and a stout silk (braided) thread is thrown over it; then the second knot in the rubber ligature is tied, and the silk thread tied over this second knot. The same may be accomplished by grasping the knot in the bite of a pair of hemostatic forceps. Thus slipping is prevented. If the écraseur is used, it is carefully tightened. The peritoneum two or three inches above the constricting wire is incised completely around the tumor, the broad ligaments being by this means allowed to retract.

FIG. 291.



Knot of Rubber Ligature secured from Slipping by Application of Silk Ligature.

FIG. 292.



Serre-nœud for Hysterectomy.

The tumor is then drawn further up out of the incision, thus forming a smaller and better pedicle. Transfixion pins are made to perforate the pedicle immediately above the wire, and the tumor is cut away about an inch above the pins. The stump is held high in the lower angle of the wound, and inspection made of the constricting wire to see that it does not include the bladder or ureters in its grasp. If in proper position, it may be allowed to remain permanently, but if not satisfactory, it is loosened and applied at a higher level; the transfixion pins are shifted to a higher point at the same time. Should the stump be too large, it must be reduced to a size not greater than an inch or two in diameter by cutting the muscular and fibrous portions away piecemeal, the wire being carefully tightened during the procedure. The peritoneum is then closed by stitching it to the serous surface of the pedicle below the wire, by means of a single silk or catgut suture. The peritoneum of the pedicle is closed by drawing it up over the stump by means of a continuous whipped silk suture. Throughout the whole procedure the écraseur is continually tightened by turning the screw. Unless this precaution be observed the tissue of the stump shrinks under the pressure of the wire, and bleeding would soon occur. If the rubber ligature be used, this precaution need not be observed. The abdominal walls are closed in the usual way by interrupted silkworm-gut sutures, passing through all the tissues but the serosa. After the stump and surroundings have been thoroughly dried an iodoform gauze dressing is applied. Pads of gauze are slipped between the transfixion pins and the skin, and are also packed carefully about and over the stump, iodoform having been freely dusted over and rubbed into the stump. The whole is covered with a thick gauze pad and held in place by a three-tailed abdominal binder.

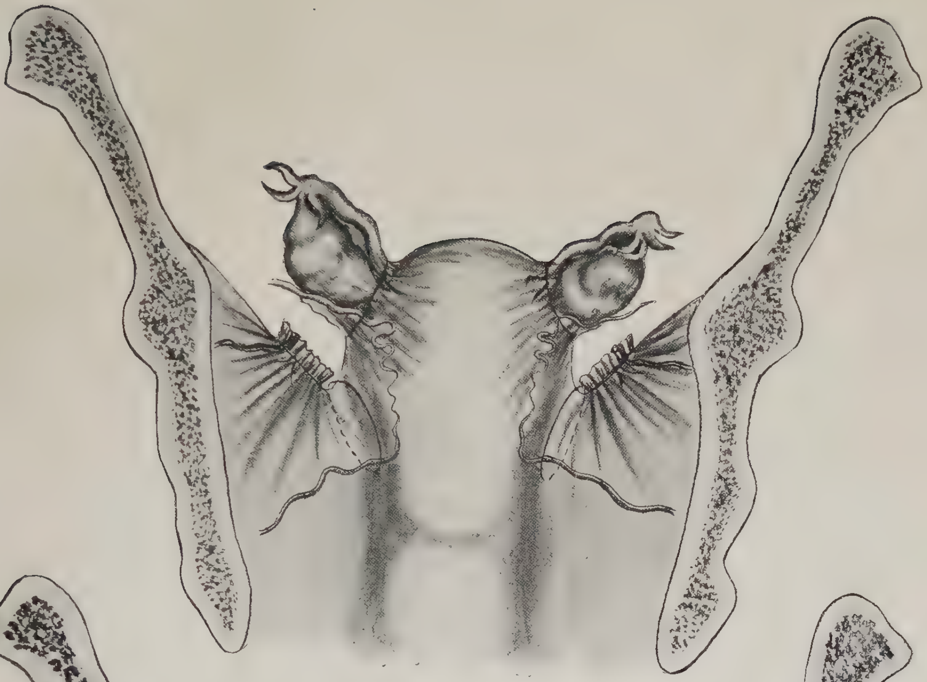
This operation can be performed very rapidly, and is applicable to all tumors with the exception of those which burrow between the broad ligament folds, and septic tumors, where the sepsis involves the neck or pedicle. The pedicle dries up and gradually melts off into the dressings or comes away as a solid mummified mass. The first dressing is made on the eighth day, when the stitches are removed, the écraseur having been kept tight by turning the key several times daily. The stump is ready to come off in from two to three weeks. If it does not come away itself in that time, it is best to remove the wire and pins and cut it away.

The stump sinks deeply into the pelvis, leaving a tube of granulating tissue, which is packed with gauze and which gradually closes. The question of drainage must be settled by the necessities of each individual case. As a rule, it is unnecessary.

There is, of course, a break in the parietes at the position of the

PLATE XXIII.

FIG. 1.



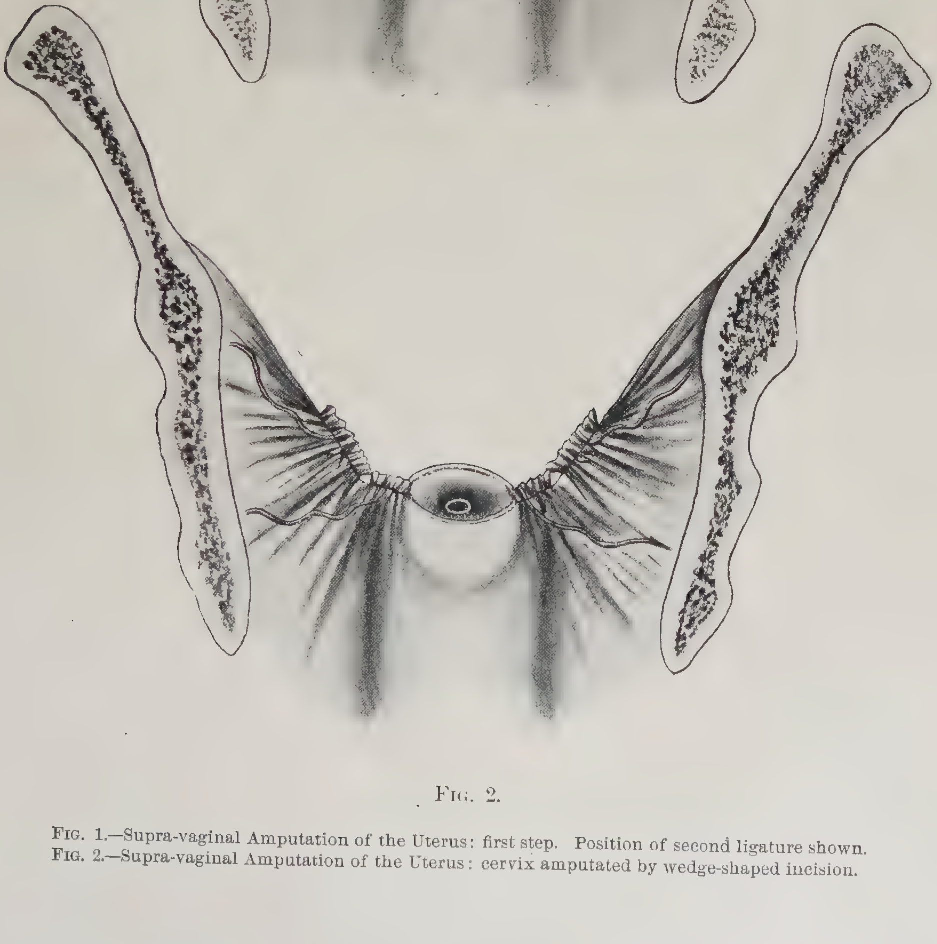


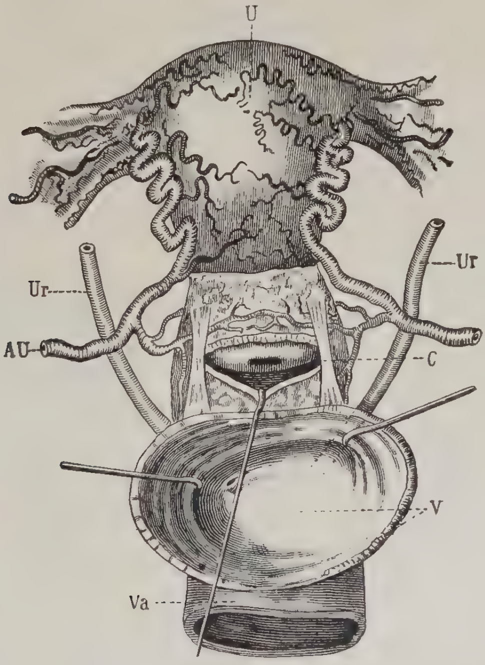
FIG. 2.

FIG. 1.—Supra-vaginal Amputation of the Uterus: first step. Position of second ligature shown.
FIG. 2.—Supra-vaginal Amputation of the Uterus: cervix amputated by wedge-shaped incision.

pedicle, which may subsequently form a hernia; so, as in all abdominal operations, these patients should wear an abdominal pad and should be kept in bed not less than six weeks or two months after the operation. Occasionally, also, a fistulous opening may remain from the cervical canal to the incision, through which air may pass up and down on exertion; this is, however, of rare occurrence, the greater danger being that of hernia.

Intra-abdominal Method.—The patient is placed in Trendelenberg's position, the abdomen opened, and the tumor delivered if possible. If this cannot be accomplished, the first steps of the operation are carried out with the tumor *in situ.* A single ligature is passed through the broad ligament near the pelvic wall and tied, not being passed deep enough to include the uterine arteries. Another ligature is made to transfix the broad ligament near the uterus, and tied. The tissue between these two ligatures is cut through, and the same procedure is repeated on the opposite side. In this maneuvre the uterus is freed from its attachments to the pelvic wall,

Fig. 293.



Relation of the Ureters and Uterine Arteries to the Cervix: *U,* uterus; *Ur,* ureter; *A U,* uterine artery; *C,* cervix uteri, displayed by a transverse incision of the anterior vaginal cul-de-sac; *V,* section of the bladder at the level of the entrance of the ureters through its walls; *Va,* vagina: two bands of fibrous tissue are seen to unite it laterally with the uterus. We can distinguish in the cervix the part not covered by peritoneum which adhered to the bladder before dissection.

and the two ends of the ovarian vessels are safely included in the ligatures. The knife is now run lightly around the tumor an inch or two above the peritoneal reflexion of the bladder in front and a little lower behind, and the peritoneum stripped down, thus forming two flaps. The uterine arteries are next ligated as they pass between the cervix and the ureter, the ligature being passed close to the cervix, in order to avoid any possibility of including the ureter in its grasp. The ligature may be passed between the flaps of peritoneum thus formed or outside of them. One is placed on each uterine artery and is securely fastened. This is the most important step in the operation. The tumor is now amputated at a level with the ligatures on the uterine arteries by a V-shaped incision, the point of the V being carried well below the point of ligation. The cervical canal is charred with a Paquelin cautery, in order to avoid any chance of septic infection from that source during the subsequent manipulations. The cervical flaps thus formed are now brought together with a continuous suture, which, after closing the cervix, is carried along, whipping the cut edges of peritoneum together from one side of the pelvis to the other. By this procedure the cervix, the two ligatures on the uterine arteries, and at times even the ligatures on the ovarian arteries, are turned under the peritoneum, thus becoming extraperitoneal. The abdomen is closed without drainage.

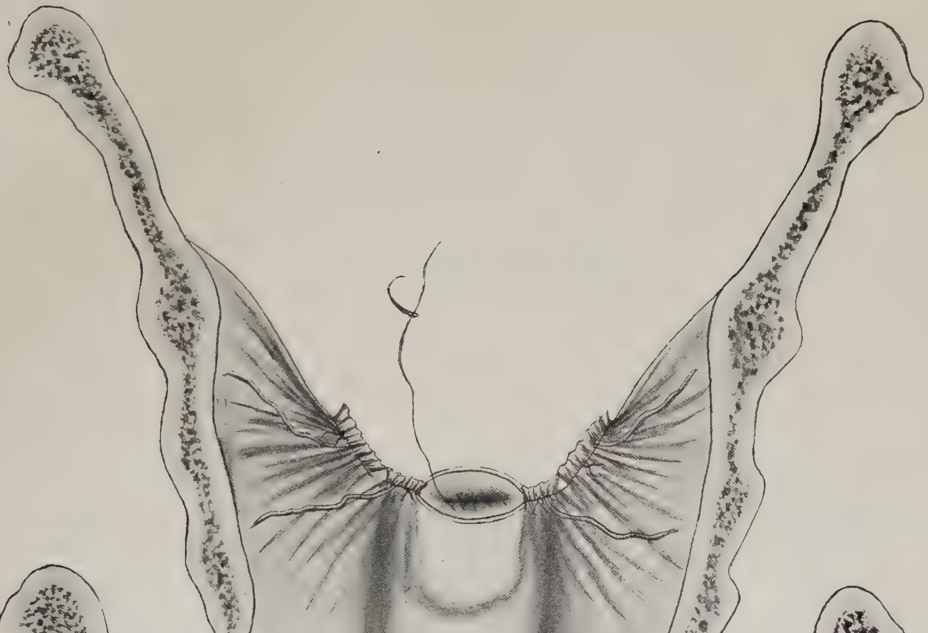
There are three elements in this operation worthy of note: its bloodlessness without elastic temporary ligation, absence of raw surfaces from dissecting off the bladder, and avoidance of ligatures about the cervix, which tissue is free from the possibility of sloughing. It has all the advantages, then, and none of the drawbacks, which attach to all other methods of treating the pedicle intra-abdominally. We believe it to be the ideal operation of its kind.

When considering the intraperitoneal operation, and in view of the ease with which the vagina may be rendered sterile, the question naturally suggests itself, "Why not go a little farther and remove the cervix too?"

Total Abdominal Hysterectomy for Fibroid.—The patient is to be prepared as for both a vaginal hysterectomy and cœliotomy. Here, again, as many times before, stress is laid upon the importance of thoroughly cleansing the vagina and the difficulty in doing so by the usual methods. Trendelenberg's posture occupies to this operation what Sims's does to vesico-vaginal fistula; it renders the

PLATE XXIV.

FIG. 3.



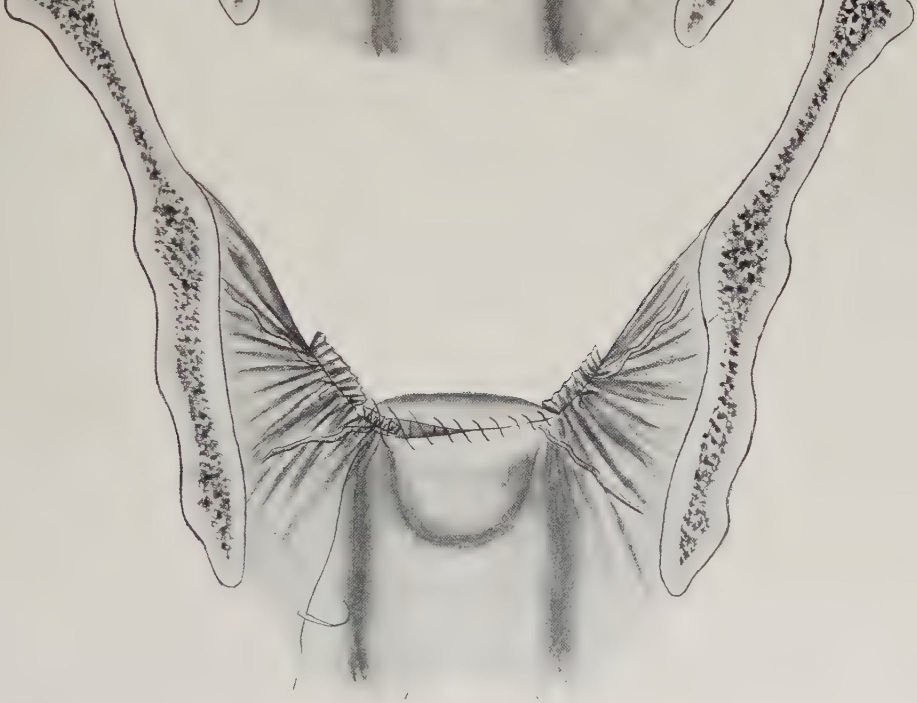


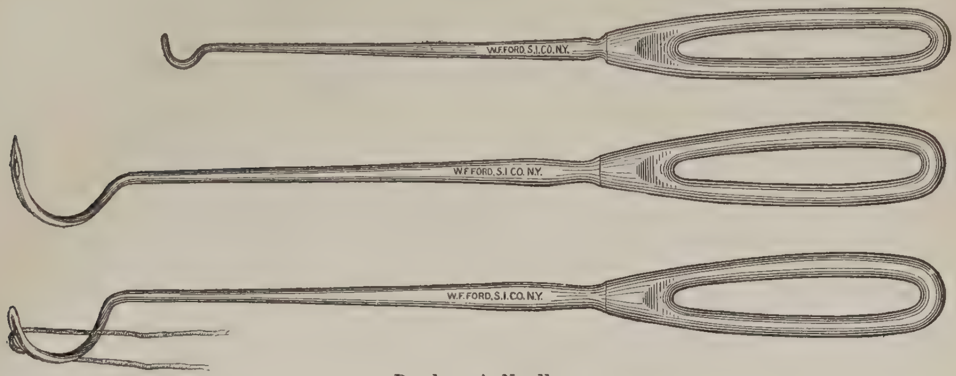
FIG. 4.

FIG. 3.—Supra-vaginal Amputation of the Uterus: cervical canal being closed by sutures which are buried by subsequent sutures.

FIG. 4.—Supra-vaginal Amputation of the Uterus: peritoneal edges of the stump in process of being whipped together, the lower stump being buried under the peritoneum.

operation not only possible, but comparatively easy. The patient is placed in Trendelenberg's posture. But two instruments need be mentioned as supplementary to the ordinary ovariotomy set: blunt and sharp Deschamp's needles for ligating *en masse.*

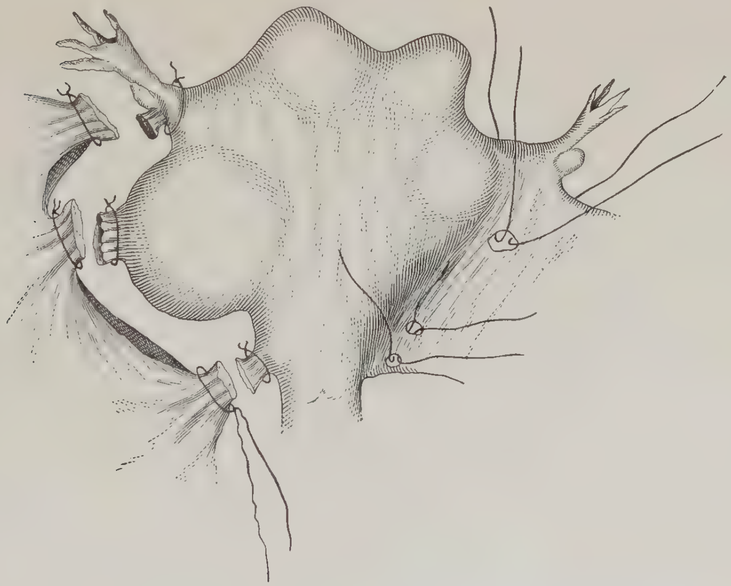
FIG. 294.



Deschamp's Needles.

The typical operation will first be described, and then its application under modifying circumstances. The objective points are the two ovarian and two uterine arteries, for these furnish the main blood-supply of the uterus and tumor.

FIG. 295.



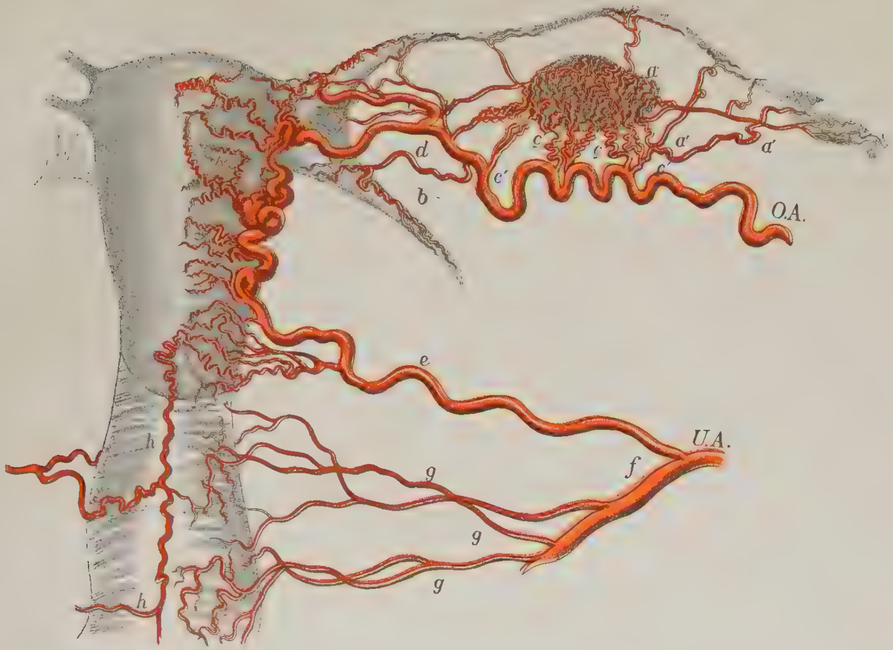
Application of Ligatures in Ablation of the Fibroid Uterus: the broad ligament on the left side tied off in three tiers of ligatures, because of the presence of an intraligamentous nodule; on the right side the ligatures are applied in two tiers.

According to the size of the tumor must be the length of the incision. It is better to first make an incision equal to the apparent size of the tumor, than to be compelled to interrupt the regular routine of the operation in order to enlarge an incision which at first was too small.

The abdomen is opened and the relations of the tumor accurately determined. A large flat sponge or a thick broad pad of sterilized gauze is employed to keep the intestines away from the pelvic cavity and to catch any blood or discharges. This sponge or pad fills in the pelvic brim very much like a diaphragm, and not only catches fluid, but also protects the intestines from bruising and manipulation. The tumor is then eventrated, if this can be done without risk of tearing any of its attachments. The next step is to tie off the ovaries and tubes, thus securing the ovarian arteries. This is done by applying a double ligature through the broad ligament, near the uterus and below the tube, as in salpingo-oöphorectomy. The two branches of these double ligatures are not to be crossed. The distal ligature on the broad ligament is first tied a little exterior to the ovary, and is cut short. The proximal ligature, crossing over the tube between the ovary and tumor, is next tied and cut short. Thus the tube and ovary remain attached to the tumor, and the tissue of broad ligament between these two ligatures is cut. The preferable ligature material is large braided silk carefully sterilized, as it will stand great strain and does not attenuate in tying. These first ligatures having been applied on both sides, it will be found that the tumor can be lifted still further out of the pelvis. It is not necessary to amputate part of the tumor, and still less so to remove it in fragments by morcellation. Such proceeding but takes time and soils the field of operation. Two other double ligatures are next applied, when necessary, from the overgrowth of the broad ligament—one set on each side, to secure the remaining part of the broad ligament down to the cervix at a level with the internal os. The object of these ligatures is to include the excess of broad ligament without going too near the uterine arteries, which may easily be felt pulsating. When the tumor is small, and the broad ligaments not very deep, these middle ligatures may be dispensed with. They are applied as are the first, and the tissues between them are cut. We now have four double ligatures applied, two sets on each side, and the tissues severed between them down to the point of control of the lowest, at about the internal os. The uterus now

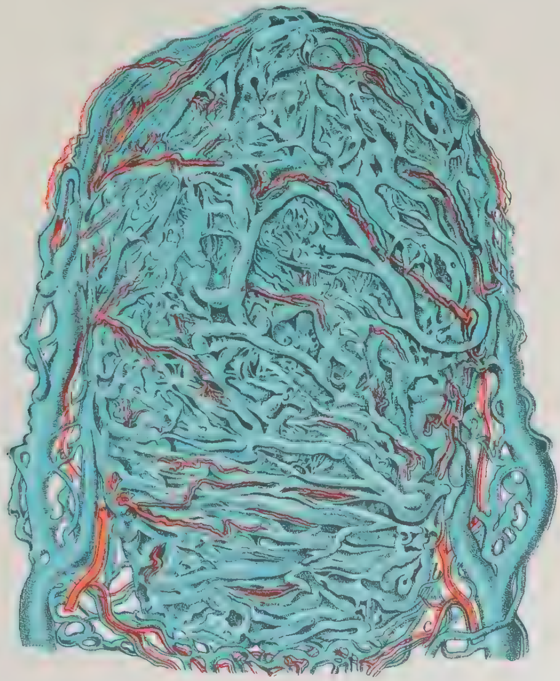
PLATE XXV.

Fig. 1.



Arterial Blood-supply of the Uterus and Adnexa: *O. A.*, ovarian artery; *a'*, *a'*, *a'*, branches to ampulla of Fallopian tube; *c'*, *c'*, *c'*, branches to ovary; *c*, branch to fundus; *d*, branch anastomosing with uterine; *b*, branch to round ligament; *e*, uterine artery; *g*, *g*, *g*, vaginal arteries; *b*, *b*, azygos artery of vagina.

Fig. 2.



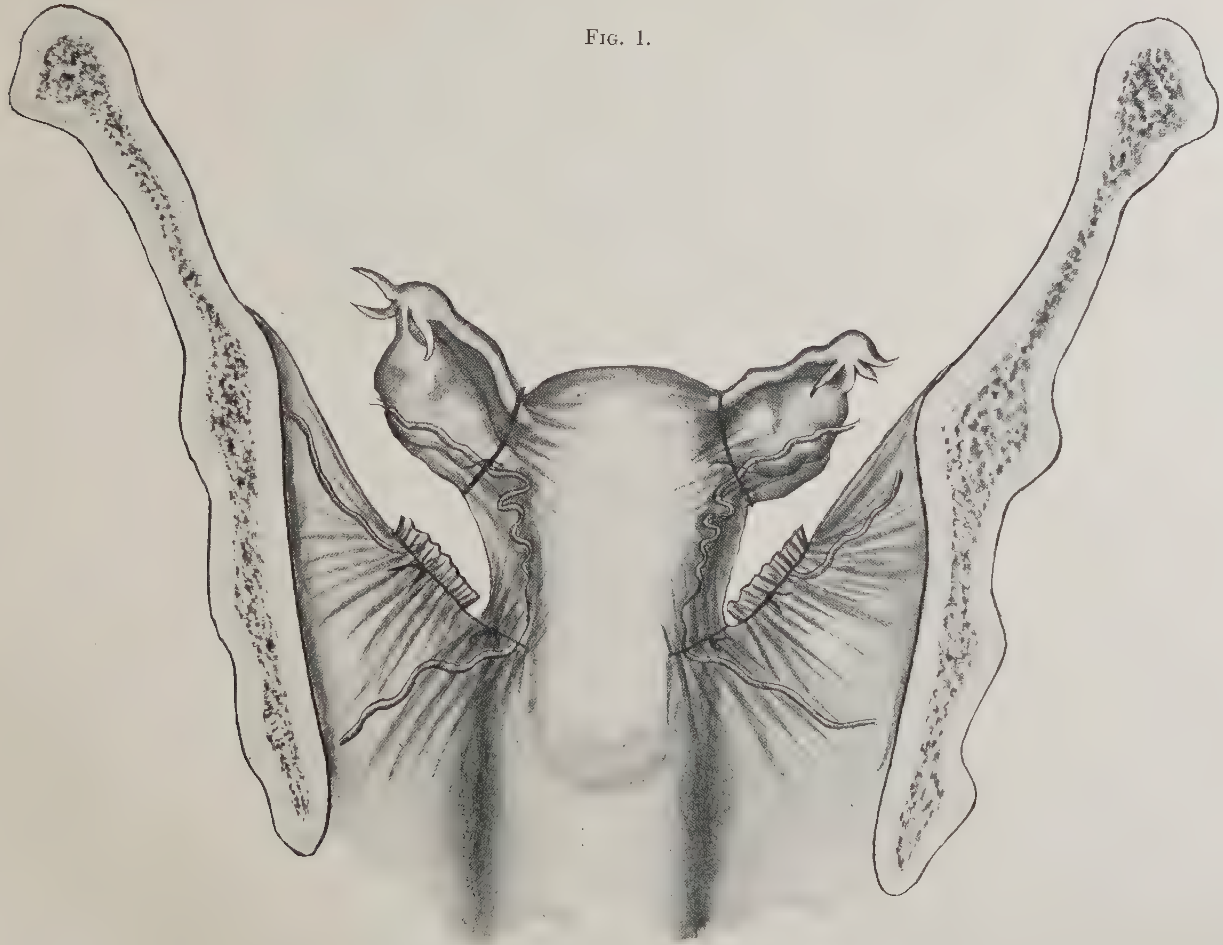
Venous Blood-supply of the Uterus: *b*, uterine artery; *c*, vaginal artery.

remains attached to the body only by the bladder and parametrial tissues. A semicircular incision is carried from side to side across the anterior face of the uterus, about half an inch above the vesico-uterine plica, extending through the serosa only. This membranous flap is dissected down with blunt scissors and the finger until the bladder is separated from the uterus and the vagina entered, care being taken to keep close to the uterine wall, lest the bladder be wounded. A guide in the vagina, as an assistant's finger, may be of service to the beginner in determining the position of the anterior vaginal fornix. Moderate filling of the bladder with urine or sterilized water is of great advantage in rendering more apparent the relation of the bladder to the uterus, as this cannot so readily be distinguished when the walls of the bladder are collapsed. The operator's left index finger is now inserted into the space between the bladder and the uterus, and the vaginal rent is carried around the cervix a little way. But the surgeon must feel sure of his anatomy in doing so, lest he go too far and cut the uterine artery. Douglas's pouch is now opened, the finger in the vaginal rent acting as a guide to the posterior fornix, and at the same time an assistant tilts the uterus over the symphysis. The finger in the vagina and the thumb above, or *vice versa*, the operator grasps between these two fingers a stout band of tissue in which the uterine artery may be felt pulsating. The Deschamp's needle is now passed, double-threaded of course, about a quarter of an inch from the cervix. The fingers so guide the direction of the needle that it does not enter the vagina, but is made to include all that mass of tissue between the last ligature applied above and down the vaginal mucous membrane, and between the anterior and posterior openings into the vagina. This ligature should comprise the uterine artery and its branches. The distal part of the ligature is now tied, and is *left long*. The other part is pulled close to the cervix and tied also, to control anastomotic bleeding from the tumor. The tissues between these two ligatures are cut, care being taken to leave an abundance of tissue to secure the distal ligature against slipping. Should there not be room enough to tie the tissue with the double ligature, a single ligature may be passed to tie the distal part of the mass while the tumor side is grasped in forceps. The same maneuvre is gone through with on the other side, and the mass is removed. But a single ligature applied to the distal end of the mass containing the uterine artery will now suffice, for there is no longer fear of anastomotic bleeding. If the uterine artery with its branches has been well secured by the last tier of ligatures, there can be no bleeding, except from small vesical branches anteriorly and from a branch of the middle hemorrhoidal in the posterior incision. These vessels are grasped and tied with fine silk or catgut. Usually two ligatures only are left long—namely, those on the uterine arteries. These are inverted into the vagina with the stumps which they include, and the pelvis is wiped free from blood and other discharges. The vagina is now snugly packed from above with iodoform gauze to a point above the lowest stump. In this way the raw surfaces of the large stumps are kept apart and away from the intestines. Instead of the gauze packing, the edges of the vaginal mucous membrane may be whipped together by a continuous catgut suture, and over this the edges of the peritoneum should be similarly united, bringing down the stumps with the cervix, below the peritoneum. By this procedure subsequent attention to the wound is dispensed with. The abdominal wound is closed and dressed in the usual manner, and an antiseptic pad put over the vulva. For a day or so the urine is drawn by a catheter. The bowels are moved in twenty-four hours by the use of salines in small doses frequently repeated. These may be supplemented by enemata. If gauze packing be used, the first dressing is made in a week—sooner if the temperature rises—and the change is made under irrigation by Thiersch's solution and the most careful asepsis. The vaginal opening above will be found closed by healthy granulating lymph. The second vaginal dressing is made a week later, when with gentle traction the ligatures on the lower stumps will usually come away. Iodoform gauze dressings are inserted gently, so as not to disturb the granulations. If perfect asepsis is observed through both operation and treatments, the patients should be up in three weeks.

Inasmuch as the vagina is entered in these cases, it must be rendered absolutely aseptic before the operation is begun. As many of the large tumors are subjected to various modes of intra-uterine treatment, including electricity, it is common to find them associated with purulent endometritis. It is useless to cleanse the vagina in such a case and leave the pus-focus; disaster could but follow. Therefore it is advisable to curette the uterus some days before the cœliotomy is to be performed, removing the first dressing the day of the operation when the vagina is cleansed, or the uterus may be

PLATE XXVI.

FIG. 1.



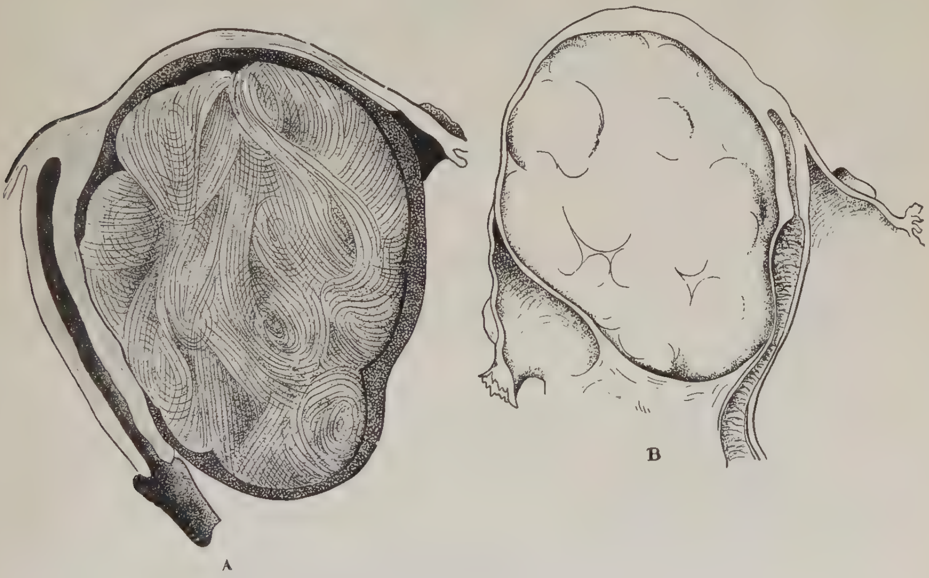
Total Abdominal Hysterectomy : first step.

tightly packed with iodoform gauze the day of the operation. If a curettage is done, the uterus should be washed out when the dressing is removed.

INTRALIGAMENTOUS (DUMB-BELL) FIBROIDS.

Fibroids dissecting into the broad ligament, posteriorly beneath the peritoneal folds of Douglas's cul-de-sac, anteriorly into the bladder, or laterally toward the pelvic walls, are the most formidable growths the surgeon meets. They are not amenable to the tardy benefits to be derived from medicinal treatment or the operation of salpingo-oöphorectomy. There being no possibility of a pedicle, they cannot be removed by supravaginal amputation.

FIG. 296.



Intraligamentous Fibroma: *A*, abdominal variety; *B*, pelvic variety.

They can be removed by but two procedures: either by total extirpation or by the intra-abdominal method.

The operation is begun as for the typical extirpation. The ligatures on the ovaries and tubes are applied as in the operation just described. Should the tumor project between the folds of the broad ligament on one side only, or otherwise so grow as to leave one side of the pelvis free from the tumor, the operation is completed on the unaffected side first; that is, after the first ligature on the ovary and tube has been applied, the middle ligatures are passed and tied, and then those around the uterine artery as in the typical operation.

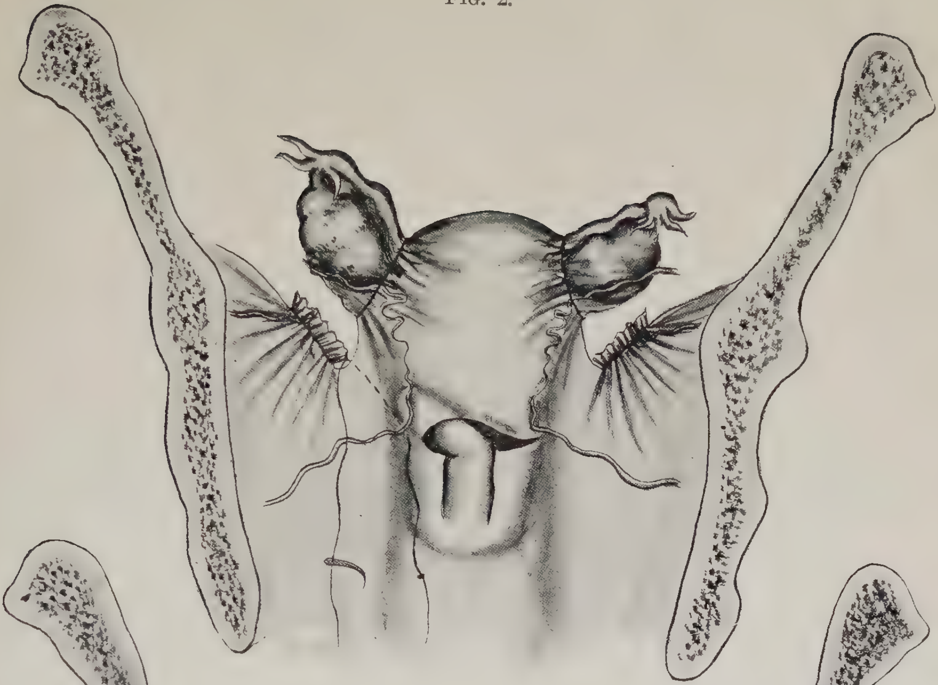
If the total extirpation be chosen, the vagina is now entered, preferably by first dissecting away the bladder, or, if that be too difficult, the vagina may first be opened through Douglas's cul-de-sac, an assistant's finger in the posterior fornix acting as a guide. This procedure enacted, the mass is rendered much more movable and more easily in command of the operator. The relations of the intraligamentous tumor having been accurately determined, the capsule over the growth is split in such a way as to avoid wounding any important structure, and, if possible, avoiding the large venous sinuses which always cover these growths, the cut in the capsule being so made as to afford two large flaps, if possible, of equal size. The tumor is now dug from between the layers of the broad ligament, or from under the post-uterine peritoneum, or away from other attachments which it may have, care being taken to keep close to the tumor in doing this. If the tumor grows posteriorly, there is great danger of wounding the bowel; if it grows to one side or into the broad ligament, the pelvic floor on that side will be stripped, and the ureter or important vessels may be wounded; when bulging in front into the bladder space, that viscus is in danger of injury.

It is impossible to describe the appearance of the vessels surrounding these tumors: they are huge sinuses. The capsule having been carefully dissected away from the tumor, and with as little bleeding as possible, we approach a point at which the uterine artery enters the growth. After the capsule is incised all efforts at enucleation should be made with blunt instruments or preferably with the fingers. This enucleation is done in a direction from without inward toward the uterus.

The assistant lifts the tumor as high as possible, putting the remaining band of tissue on the stretch. The operator, with one finger in the vaginal rent to the side of the cervix near the tumor, passes a sharp Deschamp's needle, double-threaded, through the centre of the remaining attachments of the uterus from above downward. Entering the vagina, the loop of the ligature is caught with the finger in the vagina and the needle withdrawn. The loop is then cut, forming two separate ligatures, one of which is brought anteriorly, and the other posteriorly to the side of the cervix. They are both tied, without being crossed, and left long. Both are distal ligatures, and include within their grasp all the remain-

PLATE XXVII.

FIG. 2.



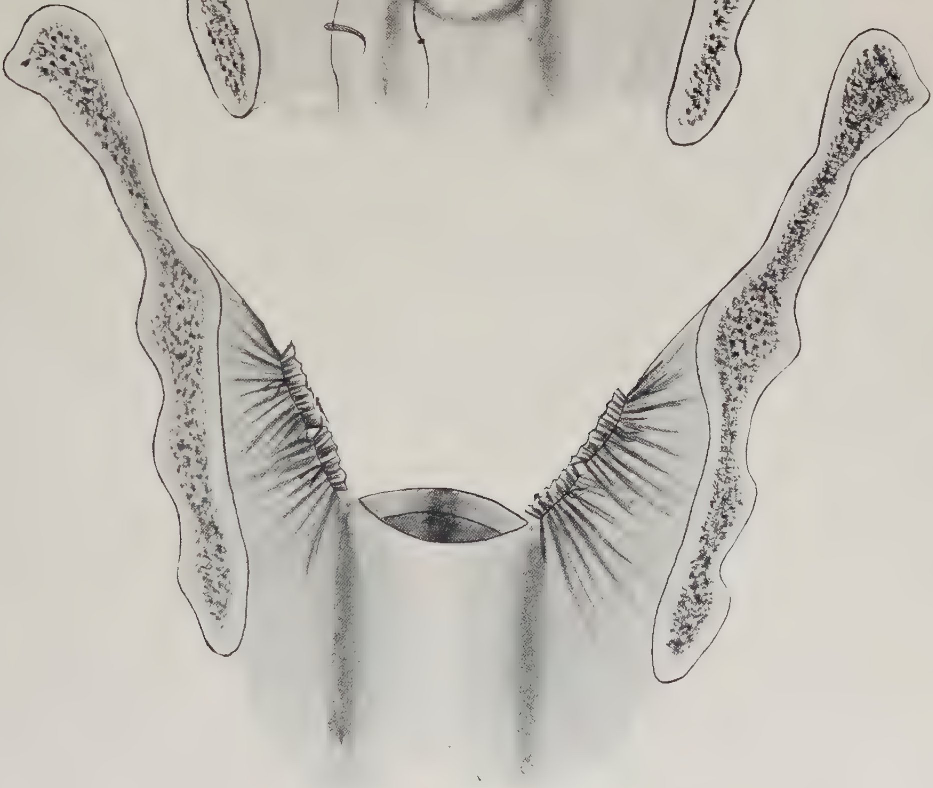


FIG. 3.

FIG. 2.—Total Abdominal Hysterectomy: second step. Vagina opened anteriorly, with the index finger in the vagina, while the ligature is being placed about the uterine artery.

FIG. 3.—Total Abdominal Hysterectomy: ovarian and uterine arteries ligated and uterus removed, leaving the vaginal vault opened.

ing tissues which contain blood-vessels. The tissues are now cut between these ligatures and the tumor and cervix removed.

If there be no part of the lateral pelvic wall free from tumor, the ovaries and tubes of both sides are first tied off; then the capsule over the smaller lateral nodule is incised, and enucleation made up to the point of reaching the uterine artery. Douglas's cul-de-sac is opened, or the vagina entered from the bladder side, if that be possible, and the double-threaded Deschamp's needle passed as in the last step of the previous operation. The two ligatures are tied as distal ligatures, and the tissue close to the cervix grasped with forceps; the tissue between the ligature and forceps is then cut, great care being taken to leave an abundance of tissue in the grasp of the ligatures to prevent their slipping. The forceps are for the purpose of controlling anastomotic bleeding.

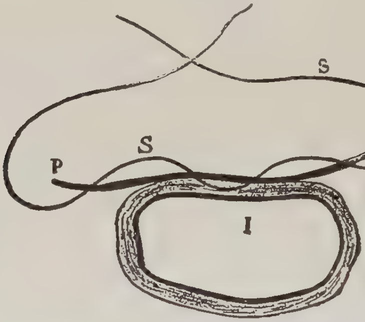
The rest of the operation is completed as when one side of the pelvis is uninvaded. The excess of peritoneal flaps is cut away, and their edges approximated accurately by sutures of running catgut. The ligatures in all these operations for intraligamentous fibroids are inverted into the vagina with the stumps they included, and the vagina is packed with iodoform gauze as in the typical operation; the packing extending, however, to the top of the cavities left from enucleation, thus securing perfect drainage of all raw surfaces. The caution is necessary in incising the capsule that a displaced ureter be not cut, as this tube sometimes lies on top of the capsule. The great rule in the enucleation is to keep close to the tumor and avoid any injury to the capsule near its base or outer extremity. All these tumors growing between or under the peritoneal planes must be operated upon with the object solely of controlling hemorrhage before cutting is done. The same small vessels are met with here in the anterior and posterior flaps as in the typical operation. Cleansing of the pelvis and other procedures are as in the typical operation.

The statement has been made that this operation of total extirpation weakens the pelvic floor and contributes to hernia through the vagina. This is purely theoretical. Such an accident is not known to follow total vaginal hysterectomy of the cancerous uterus, and it has not been observed as a result of extirpation of the fibroid organ by cœliotomy. Shortening of the vagina, however, takes place.

If the intra-abdominal method be chosen for the removal of these tumors, the steps are the same as above until the pelvic floor is reached, and then the subsequent steps are made according to the description under the Intra-abdominal Method.

Complications met during the Operation.—Adhesions may be entirely absent with the largest tumors, and, conversely, small tumors may present the most firm adhesions to important structures. They may attach the growth to any of the pelvic and abdominal contents, and are invariably of inflammatory origin. The adhesions are of two kinds, occurring as longer or shorter bands or as a close union between broadly adjacent surfaces. Bands are sparsely supplied with blood, but unions by broad attachment are very vascular. It occasionally happens that the fibroid will derive its main blood-supply from an adventitious adhesion. This is especially the case where subserous fibroids are attached to the omentum.

Fig. 297.



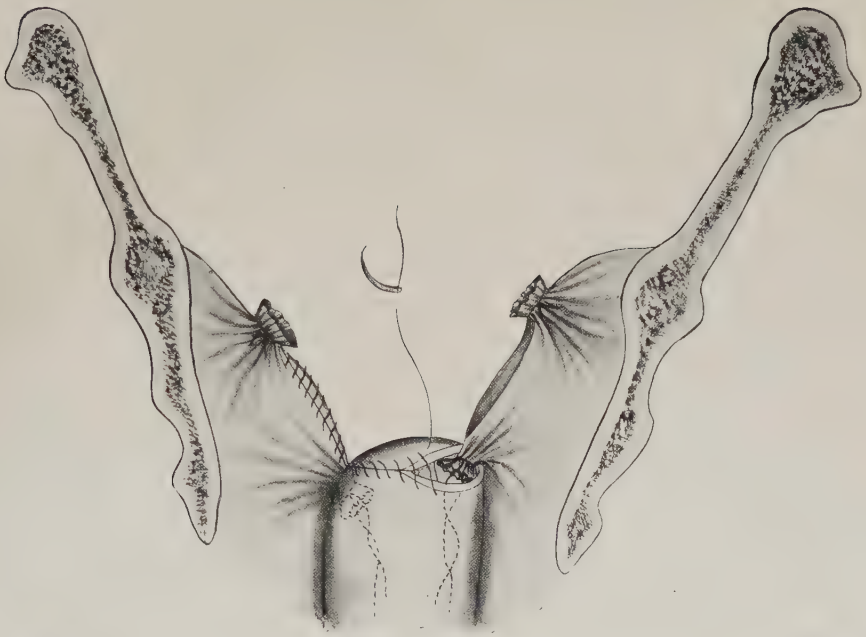
Suture of the Thin Fold of Peritoneum and Fibrous Tissue left after the Detachment of a Firm Adhesion from the intestine: *I*, intestine; *P*, peritoneal fold covering the fibroid; *S*, suture.

Band-like adhesions not very vascular may be torn with the fingers or by scissors. Those which are vascular must be cut between two ligatures. Separation of the adhesions when broad must be made at the expense of the tumor, and not of the tissue to which it grows. This is pre-eminently the rule when the tumor is closely adherent to the gut.

Adhesions are most general and firm when there have been former attacks of peritonitis. And it is the very general opinion among surgeons that electricity, whether applied intra-uterine or by galvano-puncture, even though there be produced thereby no apparently distinct attack of peritonitis, yet tends to cause the most firm and embarrassing adhesions between the tumor, parietes, and viscera. Usually, however, the electrical current in strengths advocated for the relief of hemorrhage or the reduction of a fibroid

PLATE XXVIII.

FIG. 4.



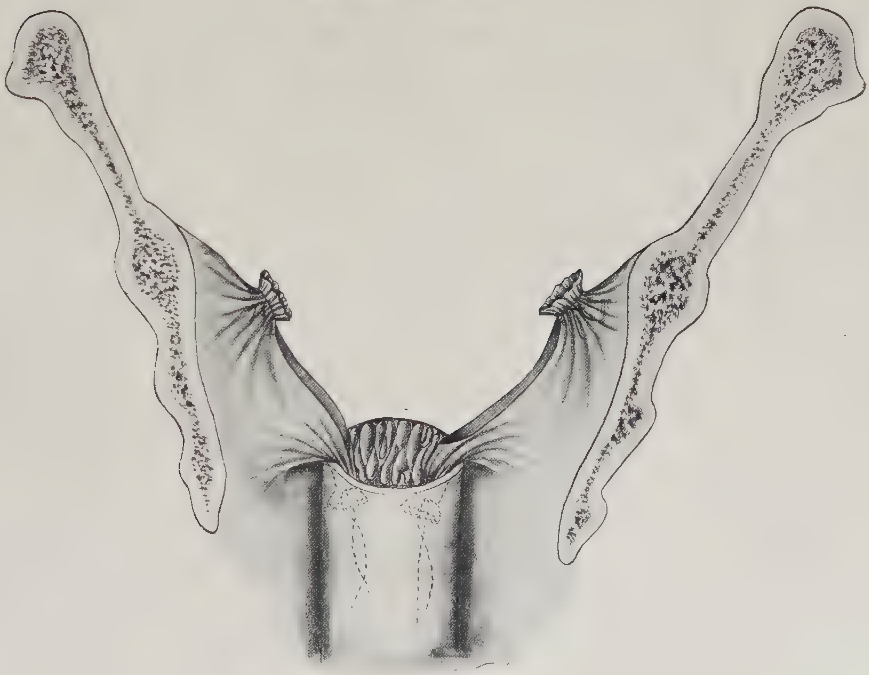


FIG. 5.

FIG. 4.—Total Abdominal Hysterectomy: vaginal vault in process of closure, with lower stumps drawn into the vagina. Opening in the left broad ligament closed.

FIG. 5.—Total Abdominal Hysterectomy: stump drawn into the vagina, and vaginal opening packed with gauze.

will produce distinct peritonitic inflammation. It is always a matter of regret to the surgeon that a case to be subjected to the radical operation has previously been in the hands of the electrician, for he knows from experience that it is just such which present the greatest complications.

Tubal and Ovarian Disease—Very commonly, hypertrophic salpingitis and chronic oöphoritis are associated with fibroid tumors. But inflammatory lesions of tubes and ovaries are generally due to a septic or specific endometritis. As frequently producing such changes in the endometrium are the various means applied for the relief of hemorrhage and attempts at reduction of the tumor. Such are filthy curettements, injections of astringents, and electricity. In other words, here more than in the uterus not the seat of neoplasm do we find improper intra-uterine manipulations one of the causes of complications in the adnexa or peritoneum. Milder degrees of tubal inflammation may result in occlusion only, thus producing hydrosalpinx.

It must not be forgotten that fibroid may exist coincidently with ovarian cystoma. Pus-tubes or ovaries should, if possible, be removed before the extirpation be begun. But cases do occur where the extirpation must first be made, the pus-focus being tied off from the tumor and enucleated as a last step.

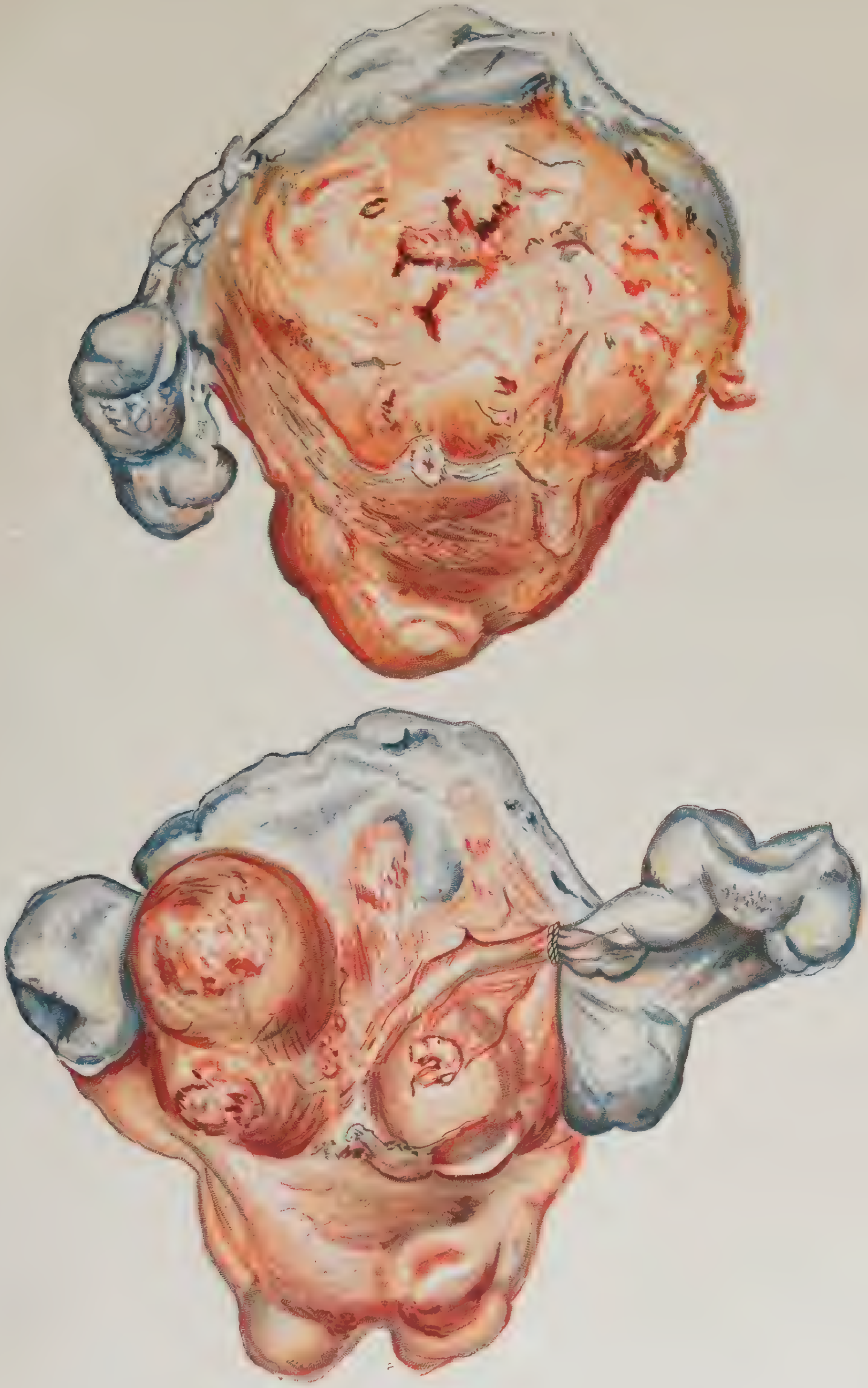
In such cases the gauze packing must extend to the denuded surface produced by the removal of the pus-focus.

General Considerations.—The treatment to be selected for each case must not be determined by the character of the tumor alone. Other considerations are to be entertained before arriving at the final conclusion. A patient who is in easy circumstances, who can afford idleness, and can secure comforts may well spare a few months of her life devoted solely to the effort of getting well by palliative and mild methods. The poor woman, a burden to her friends and unable even to secure necessary physical rest, will demand a measure which is radical. The general physical condition of a patient will determine the character of the operation more than any other one thing. An exsanguinated woman who is in good flesh will stand a long operation very well, but it is different with those who have large tumors or other tumors producing pressure symptoms. Apart from the possibility of liver and kidney complications, these latter women suffer from a form of heart degeneration which renders prolonged narcosis dangerous; this is especially so, if there be kidney disease.

Therefore it may be that many of the radical procedures would waste valuable time, and the most rapid method must be employed, even though it be incomplete. In any case where radical operation is indicated total extirpation can be as rapidly and safely performed as that particular procedure which seems especially applicable. In skilful hands it does not take longer to extirpate the entire uterus than to properly attend to the stump by the various other methods. Tumors characterized by profuse hemorrhage should be removed by total extirpation. Total extirpation is applicable to every variety of tumor. Some of the other methods have limitations, and there are certain tumors not amenable to each operation.

Suprapubic amputation is not to be applied to virgins who have very short vaginæ, to fibroids which dissect into the broad ligaments, to those which burrow into the floor of the pelvis, and to those which already are septic. Hegar's or Tait's operation of removal of the adnexa to induce artificial menopause and cut off part of the blood-supply has produced results which command our most careful attention. That it will check the growth of some tumors, and often cause them ultimately to disappear, is undoubted. But it is not immediate in its effect on the size of the growth, though the hemorrhages may cease at once. Therefore those tumors which have dangerous or very painful pressure effects demand a more radical procedure. It is hard to say just when the operation should be applied to the exclusion of all others. For tumors which respond most readily to this treatment also give the best results from a radical operation. Certain interstitial and subserous tumors require the greatest skill in their removal. In certain rare cases of intraligamentous growths, and in patients who will not bear a radical operation, we would suggest the salpingo-oöphorectomy. Tumors of the soft, œdematous, fibro-cystic variety are but little, if at all, influenced by this operation. It is, then, limited to cases of hard myofibromata, and chiefly to those in women under thirty-five—the very cases giving the best results from total extirpation. It must undoubtedly be considered an incomplete operation with a limited application. For the natural menopause does not often come on in the presence of fibroid. In fact, the latter continues the bleedings indefinitely. Tying off the ovaries and tubes, then, very often utterly fails in stopping the bleedings, for the operation merely removes the least factor in the causation of the hemorrhage, the adnexa. It does limit the bleeding somewhat in all cases by cut-

PLATE XXIX.



Intraligamentous Fibroid Tumor of the Uterus with Hydrosalpinx, showing the portions of the tumor which were buried under the peritoneum in the connective tissue: front and back views.

ting off the blood-supply through the two ovarian arteries, and removal of the adnexa takes away the stimulus to menstruation. But the perverted and pathological function has usually gone too far to be controlled by such mild means.

In his last work Tait quotes 262 cases with 4 deaths—1.5 per cent. mortality, about that incident to the electrical treatment, with vastly less suffering, much better results, and less injury to the woman in case the operation fails and a radical one becomes necessary. But these figures are for uncomplicated cases of fibromyoma.

We would, then, summarize the treatment of fibroids about as follows: Small submucous fibroids which can readily be removed *per vaginam* should be subjected to that method. All others demand different procedures.

The patient's general condition and the character of the tumor would determine whether or not to operate. Those cases in which the decision is against operation should be treated by ergot.

An operation deemed advisable, in all cases the total extirpation is indicated to the exclusion of every other operation, unless there be some special indication against it. There are no special objections to substituting the intra-abdominal method, it being in all essential respects a total extirpation, provided there is absolutely no possibility of cancer in the tissues of the cervix left by the operation.

The intra-abdominal methods of Zweifel and Schroeder are no longer necessary. The great leap has been from the extraperitoneal operation to the complete extirpation. And at the same time we leave a partial operation with a tedious convalescence, adhesions about the stump, and possibly hernia, for a complete operation, with a mortality less than 8 per cent. in the worst kind of cases, and no disagreeable sequelæ. In *selected* cases which have escaped electricity and other intra-uterine treatment the mortality should be not more than 3 per cent.

Causes of Death after Cœliotomy for Fibro-myomata.—Hemorrhage after the intraperitoneal method is the immediate danger. It is presumed that the surgeon will not close the abdomen until all oozing has been controlled. Therefore secondary hemorrhage is the one to fear. The patient has sudden pallor without assignable cause. The pulse becomes rapid and small. There is an anxious expression about the face; cold sweat covers the body and the temperature becomes subnormal. The patient should at once be put into Trendelenberg's posture, so that auto-transfusion from the lower parts of the body to the chest may be thereby performed. This procedure also limits the amount of bleeding markedly. Cutaneous transfusion of sterilized salt solution into the scapular regions, along the borders of the latissimus dorsi muscle, should be employed, while preparations are making to reopen the belly. We cannot speak too highly of Trendelenberg's position in all cases of bleeding from the pelvic floor. Examination is of no aid to us in these cases unless the bleeding takes place into the broad ligament, and even then it may have formed there immediately after the operation. Blood escaping into the pelvic peritoneal cavity does not coagulate for many hours, and gives us no signs of its presence while in a fluid state. Bleeding from the extra-peritoneal pedicle is readily detected. If it occurs from the breaking of an elastic ligature, a Koeberle's écraseur should at once be thrown around the stump. Bleeding after the intra-abdominal operation will show from the vagina. The same is true when bleeding follows extirpation of the entire organ, unless the leak be from the ovarian arteries.

Sepsis.—This now may be very well controlled, inasmuch as not one death in five is due to it after extirpation.

Temperature after extirpation is not usual, and must give rise to grave suspicions of the technique. It may be produced by tympanites, by incomplete preparation of the patient's bowels, by diseases of the liver and kidneys. It is therefore imperatively necessary to open the bowels the day after the operation, or just as soon as the ether nausea has passed off, allowing the stomach to retain the salts. Twenty grains of Rochelle salts every half hour, for from four to eight doses, will accomplish the desired result. Purgatives containing calomel may be tried if the stomach be particularly irritable. Triturates of calomel, one-half of a grain, with aloin, one-eighth of a grain, may be given. Two doses, two hours apart, will suffice.

When a case becomes septic after the extra-peritoneal treatment, careful scrutiny of the stump and wound should be made for pockets of pus. If the sepsis arises from intra-abdominal causes, secondary laparotomy is about useless, but may be tried as a last resort.

Sepsis after the intra-abdominal method occupies the same position unless localized around the stump, when the pus may be evacuated from the vagina.

If sepsis occurs after total extirpation, the vaginal dressing should be removed and the stumps and vaginal vault examined. Any pus-focus in the pelvis can thus be detected and drained. Should it be deemed wise to go further and again open up the abdominal cavity, it may be done without narcosis by using the finger in the vagina to break up the lymph union. This having been done, the pelvis should be irrigated with Thiersch's solution, and the gauze packing again introduced from below to fill if possible the pelvis.

Shock.—In the greater number of cases of this condition hemorrhage has taken place. The narcosis may prove too much for the patient, inasmuch as brown and fatty heart degeneration is a frequent result of fibromata, and she may die from heart failure. In this condition hypodermics of nitro-glycerin, $\frac{1}{100}$ grain, with rectal injections of rye whiskey, one part to four of warm milk, are indicated. The nitro-glycerin is a powerful heart tonic, and may not be repeated more often than once in three hours. Strychnia is useful as a substitute for nitro-glycerin when it is desired to stop the use of the latter. Prolonged exposure and rough handling of the viscera are conducive to shock and must be avoided. They are minimized by the use of Trendelenberg's position.

Intestinal Paralysis.—After the removal of large fibroids, and also, occasionally, when moderate-sized interstitial growths are removed, a condition which has been termed intestinal paralysis may ensue. It is characterized by a cessation of the normal peristalsis of the intestines. It depends upon one or both of two causes—the sudden relief of the intra-abdominal pressure by removing a large growth, thus allowing the intestines to become engorged with blood, and the shock to the sympathetic system from the removal of an organ so intimately connected with it as is the uterus. To lessen the flux of blood to the abdomen after the wound is closed, a large elastic abdominal dressing of dry cotton should be so applied as to exercise a pressure over the whole abdomen. To lessen the shock to the sympathetic, the administration of strychnia in $\frac{1}{40}$ gr. doses, three times a day, should be begun a week before the operation. This intestinal paralysis is characterized by inability to move the bowels by the ordinary means, by tympanites, and in a few days by temperature if the tympanites be excessive. If, then, we give opium to these cases, it merely contributes to the supervention of the very condition we wish to avoid. Calomel gr. $\frac{1}{4}$ triturated with aloin gr. $\frac{1}{8}$ every hour until five doses are taken, followed, if necessary, in six hours by a high enema—an enema extending to the upper part of the descending colon, of Rochelle salts one ounce in a quart of water—will usually suffice. The combination of calomel and aloin is recommended as producing a more free outpouring of bile, which is the best excitant of peristalsis.

This paralysis of the bowels has often been confounded with intestinal obstruction and sepsis. The differentiation is difficult. In sepsis the first symptoms are fever and high pulse-rate, whereas these occur later in intestinal paralysis. Intestinal obstruction produces pain at the seat of obstruction in addition to the other symptoms of reversed peristalsis, as fecal vomiting.

During the operation certain *accidents* may happen. Wounds in the intestine should be immediately closed by silk sutures, applied in two tiers. Should so large a portion of gut be torn out as to render obstruction probable if the rent be closed, it is necessary to fasten the opening into the abdominal wound, forming an artificial anus, or to make an anastomosis. Openings into the colon are to be treated in the same way. If the rectum be entered, it is necessary to close the opening as well as possible, and to employ a gauze packing of the pelvis so as to form a fecal fistula in case the suturing of the opening in the bowel should separate. Experience and the use of Trendelenberg's position will render such accidents rare. If extirpation has been performed in such a case, through and through drainage from abdomen to vagina with gauze is necessary, the two packings meeting at the fistula. In all these cases where the rectum is wounded the pelvis must be *filled* with gauze, thus keeping all the intestines in the general abdominal cavity. A wall of lymph will then form and cover over the pelvis entirely, so that the field of surgical interference and injury is entirely shut off from the general peritoneal cavity. When the rectum is wounded, the sphincter ani should be widely dilated and a large short tube introduced, so as to give free vent to intestinal gases.

Adherent omentum may be tied off *en masse* by a double ligature.

Injury to the bladder is not serious. The wound should always be closed by silk, catgut being too unstable. After injuries to the bladder a permanent catheter should be left in position for four days and carefully watched to see that it does not become clogged. It should be removed each day to be cleansed, and immediately reintroduced. Injury to the bladder is best avoided by having it moderately distended, so that its contour is easily recognized.

Wounds of the ureter will be accompanied by the passage of decreased quantities of urine, and that drawn from the bladder will be found microscopically to contain red blood-corpuscles.

If the ureter be wounded during the operation, the outlook for the patient varies in accordance with the position of the injury. If the injury be near the floor of the pelvis, the ureter may by careful dissection be separated and sutured into the vagina or the bladder. If the wound be high up, the kidney of that side may be removed, or, preferably, the ureter may be sewed into the abdominal wound. If both rectum and ureter are wounded, the ureter should be fastened in the rectal wound after the tumor is extirpated.

If the patient survives such an accident, the consideration of extirpation of the kidney or other procedure will arise.

These operations should be performed as rapidly as is possible without interfering with the technique of the method.

Total extirpation is merely the application of Freund's operation to the treatment of fibroid.

The credit for this application is due to Bardenhauer of Cologne. Following him in Europe was Martin. In America, Eastman first performed the operation by a rather complicated technique. To Krug belongs the credit of perfecting a method by which the operation may be rapidly and easily done, the essential features of which are the use of Trendelenberg's position and the severing of the tissues under the guidance of the eye.

The method of total extirpation here described is practically that first published by Krug.

The operation has been given much prominence and has been advised to the exclusion of all other radical measures because it has been employed in the greatest possible range of difficult cases. In one city alone the operation has been done fifty times with four deaths—a mortality of 8 per cent. Many of the cases so operated upon were refused admittance to several hospitals as being inoperable.

Salpingo-oöphorectomy for Fibroid.—This is sometimes exceedingly difficult, owing to the tumor pinning one ovary and tube deep in the pelvis. Should this be the case, an assistant should attempt with the hand in the vagina to raise the entire mass from the pelvis. The ovary and tube having been found, the blunt Deschamp's needle should be passed as close to the uterus as possible without wounding the anastomotic coil between the ovarian and uterine arteries. One ligature is then tied very close to the cornu, so as to include the sympathetic nerve of the tube, and the broad ligament is tied below the ovary. Both are then removed. The ordinary locked suture is employed. It is not necessary to use the Paquelin cautery.

Sometimes also the tumor so grows beneath the ovary and tube that these are spread out over its surface and merely form part of its serous capsule. Their removal is here impossible. The operation is not applicable to fibro-cysts; it controls hemorrhage in about three-fourths of the cases, causing rapid diminution in the size of the organ in about three-fifths, and, excepting Tait's unequalled figures, has a mortality of 5 per cent. His results are only for removal of *uncomplicated*, non-suppurating ovaries, and tubes; he reports 262 cases with 4 deaths.

The operation is only applicable to small pelvic growths and to such of these as have appendages which can be easily removed; otherwise hysterectomy is preferable.

PELVIC INFLAMMATION.

It is intended to include under this heading all those pelvic inflammatory diseases which involve the Fallopian tubes, the ovaries, the pelvic peritoneum, and the pelvic cellular tissue—all those conditions described by the terms salpingitis, pyosalpinx, ovarian abscess, perimetritis, parametritis, peri-uterine phlegmon, pelvic abscess, pelvic cellulitis, pelvic peritonitis. These conditions are so intimately associated and so constantly complicate each other that it becomes impossible to treat of one without taking into consideration several or more of the others. Rarely does a pyosalpinx exist except it be complicated by a pelvic peritonitis, and in all probability a pelvic cellulitis, the peritonitis and cellulitis arising from the same source as the salpingitis, and not being independent lesions. The abscesses, for the most part, are results of the more advanced stages of these same conditions, and in themselves rarely exist as independent factors. It is hard to study these inflammatory productions without seeing a direct line of cause and effect. With our present knowledge of these matters it is no difficult thing to trace the infection from its inception, and to recognize its course in the lesions left behind as it pursues its destructive way.

It is our purpose, then, to deal with this subject as though it were a single disease—as in fact and in truth it is—and of each of the resultant factors as simply the same disease attacking, in its progress, the different anatomical portions of the female pelvis, leaving in each locality an apparently different and independent lesion, the lesion differing in accordance with the structure attacked, with the severity of the attack, and with the stage at which the progress of the disease has been stayed. It were just as rational to consider the peritonitis, the cellulitis, and the abscesses complicating an appendicitis as independent of the inflammation of the appendix as to separate these same conditions from the salpingitis. In the case of the appendicitis the infection comes from inside the appendix, and, having passed through its walls, attacks first the peritoneum, and secondly the cellular tissue.

In the same manner does the infection which destroys the pelvis come from the Fallopian tube, only, instead of being compelled to pass through the walls of this organ, it the more readily finds its way through the fimbriated opening directly into the peritoneal cavity and secondarily into the connective tissue. The amount of destruction accomplished will of course be in direct relation to the severity of the infection. Some attacks will not proceed further than the Fallopian tube itself, and often end even there without suppuration. The inflammatory process may extend into the peritoneal cavity and confine its ravages to the peritoneum itself, or it may extend deeply enough to involve the cellular tissue, causing it to break down and suppurate. The reason these differences exist in individual cases is only to be explained by the character of the infection and its virulence. At times two given cases will not progress in exactly the same manner, even where the origin has been the same. Some local condition may exist so as to materially modify the course of the disease in the one case, while the other one may proceed rapidly to an amount of destruction which can never be repaired, if not unto death itself. When it is fully realized that this whole group of diseases originates from a common point and from a limited variety of infections, the importance of a careful study and understanding of these becomes at once apparent.

Inflammations of the female pelvis and pelvic organs constitute a very large proportion of the diseases of women. They are the most destructive and dangerous, as well as the most incurable, cases that the physician has to treat, provided they once gain headway or have accomplished their ravages before they come under observation. At the same time, taken in their incipiency, they are readily retarded and cured. As in all other conditions, where it can be accomplished it is much easier to prevent the subsequent ravages of the inflammation than to cure the resultant lesions. As a rule, after the fire has once swept over its course such destruction has resulted that a cure short of surgical methods is out of the question, and at times even these are unavailing. Once allow a woman to contract pelvic inflammation with all its possibilities, and allow the disease to run into a chronic condition, the chances are that she will have acquired such a degree of invalidism as to feel the results for the rest of her life, even though the disease be removed. Many of these women never, under the most favorable circumstances, regain their former state of health.

Causation.—Pelvic inflammations arise almost without exception from either septic or specific infection. The exceptions are those rare cases in which the disease has had its origin in a sudden suppression of menstruation or where it is due to the irritation of neoplasms, such as fibroid tumors and ovarian cysts. Even in these exceptions it becomes a question at times whether or not the peritonitis, be it acute, has not originated from septic material contained in a diseased Fallopian tube or ovary. Chronic inflammation may be readily engendered by the irritation due to the presence of an abnormal growth in the pelvic cavity, but such a process seldom brings about such disastrous results as do the acute inflammatory attacks. The changes here are more of a gradual thickening and hypertrophy of the epithelial and interstitial elements, and there is little or no danger of resultant adhesions or abscesses. A very great many neoplasms are complicated by disease of the Fallopian tube. It is obvious what chances there are of a leakage of infective material from an enlarged and diseased tube. Even where there is no leakage through the fimbriated end, or no rupture of the walls of the organ, yet it is a well-known fact that the peritoneum about these members is peculiarly liable to attacks of inflammation, probably by extension of the disease directly through their walls. Any given case of pelvic inflammation complicating the growth of a neoplasm is always open to the just suspicion that there is, in addition to the new growth, a lurking infection in the Fallopian tube. In such a case the cause of the inflammation would again be sought in a septic or specific poison, brought about in much the same manner as are the vast majority of cases of pelvic inflammation. It is well known that the rupture of some cystic tumor, and the emptying of part or all of its contents into the abdomen, may give rise to this same character of trouble. These cases are, however, the exception, and usually, when they do occur, it is not difficult to differentiate them. Those cases which are apparently due to the traumatism incident to operations, the use of the uterine sound, the introduction of sponge tents, and other similar procedures are beyond doubt caused by the addition of septic poison to the traumatisms, and not to the mere wounds themselves. Careful use of ordinary antiseptic precautions will obviate any chance of such mishaps. If a patient be suffering from venereal disease, and a solution of continuity of the mucous membrane, either of the vagina or uterus, be made in the course of an operation or an examination, it is hardly to be expected that there shall be a universal escape from some of the disasters of a spread of the infection into the connective tissues through the open wounds so made.

If, however, the disease be cured prior to an attempt at operative procedures, or even if great care has been taken to disinfect the parts to be operated upon, the chances of infection are minimized. The same may be said of infection carried by dirty instruments during the course of an examination. It is extremely problematic whether or not many cases have resulted from such sources where even the most ordinary care has been taken with the implements used. A speculum or a pair of dressing forceps must be noticeably dirty to carry infection from one patient to another, particularly if the mucous membrane of the vagina be reasonably sound and healthy. The danger resulting from the use of a sponge tent is likewise due to a septic condition of the tent or of the vaginal or uterine canals. And so with most other instruments usually held accountable for the origin of pelvic inflammations. As in the case of neoplasms, so in all cases that require the use of instruments, it is far more likely that there is already existing the source of infection in the Fallopian tubes, ovaries, or peritoneum than that the use of these instruments has originated the attack. If a woman has a diseased and possibly adherent Fallopian tube, especially if it be distended with pus, any manipulative interference will surely tend to relight an inflammation which had become quiescent, and had probably remained so for years. If the disease be originated by the mere use of the instrument, it is almost certainly not due to the introduction of septic or specific poison as an additional element in the case. It is problematic whether traumatism *per se* ever originates pelvic inflammation. The peritonitis due to sudden suppression of menstruation does not, as a rule, leave behind it any such traces as are left after an attack of septic peritonitis. The inflammation is of a frank, open character, without usually any tendencies to the exudation of plastic lymph, such as will not subsequently be absorbed. When such an attack has cleared up, there are left no microscopic lesions, except it be in the ovary itself, and here the changes are more likely to be of an interstitial character, such as follow chronic inflammation in these organs. Frequently these attacks do not amount to anything more than a severe congestion, stopping short of true inflammation, rest in bed and depletion accomplishing a speedy and permanent cure. Pelvic peritonitis caused by venereal excess, independent of any other factor, is more than doubtful. The traumatism, it is true, incident to such excess would tend to foster such a result, but the continued relief from congestion due to the repeated normal terminations of coition would tend to promote anemia of the parts rather than congestion. As in the case of many other supposed causes, a previously diseased condition of the uterus or uterine appendages is in all probability at the bottom of the trouble, in which case it is easy to understand how the incidental and repeated traumatism would bring about the result.

Septic or specific infection of the genital canal is the cause of the vast majority of pelvic inflammations. Septic infection enters in one of two ways: either through wounds caused by operations (the use of tents, the use of the uterine sounds, specula, and other instruments) or through the wounds caused by childbearing and abortion.

Puerperal septicemia outweighs by far all the other sources of septic trouble, and compared with this source the others are practically nil. Puerperal septicemia rivals, and even exceeds, gonorrhea as an etiological factor in these diseases. The analysis made by Bernutz of 99 cases of pelvic peritonitis shows at a glance the two great factors in the production of pelvic inflammatory troubles:

- 43 occurred in puerperæ;
- 28 " after gonorrhea;
- 20 " during menstruation.
- 8 traumatic
  - 3 due to venereal excess;
  - 2 " syphilitic disease of the cervix;
  - 2 " introduction of the uterine sound;
  - 1 " use of the vaginal douche.

This table is susceptible of considerable modification, and if the whole truth were known it is more than probable that every case in it could have been traced to gonorrhea or post-puerperal septicemia had as much been known of these troubles in the time when the cases were tabulated as is known about them at the present time. It is more than probable that in every one of the 8 traumatic cases and in the 20 recorded as occurring during menstruation, there was present a pre-existing inflammatory disease in the pelvis which was only awaiting some favorable opportunity to develop. That twenty of the attacks took place during the menstrual period is only what could be expected. At this time there is a natural congestion of the pelvic organs; this congestion, added to the already existing inflammation, latent perhaps, but none the less real, would place the patient in the best possible condition for any outside influence to determine the resulting acute attack of pelvic inflammation. Forty-three of the cases are recorded as occurring in puerperæ, and twenty-eight after gonorrhea. A second glance is convincing that in all probability a few of the puerperal cases were caused by gonorrheal infection—just what proportion it is impossible to tell. The argument might, in fact, be brought to bear in every case of post-puerperal septicemia, that the woman had previously been infected with gonorrhea, else she would not have developed the puerperal disease. Such is undoubtedly the case in many instances, but, in spite of the great possibility of such an occurrence, there is yet a large proportion of cases which undoubtedly arise from a puerperal septicemia, entirely independent of venereal contamination; the proportion is fully as large as in that class where the cause is unquestionably gonorrhea. This is even true of many of those women whose husbands have perchance contracted a gonorrhea in their younger days before marriage. Because a man has once been afflicted with venereal contamination, it by no means follows that he always retains the disease, as has been contended by some writers, and that he is sure to contaminate any woman with whom he has intercourse. Whether or not the gonococcus is the cause of gonorrhea, it is notorious that many discharges contain this factor without being able to reproduce the disease. It has been shown also that it is not possible to infect the healthy mucous membranes with the discharges from some cases of chronic gleet. On the other hand, experiments have been produced to show that quite the reverse of this is true. However this may be from an experimental point of view, certainly the relation of cause and effect in such a case as the following is apparent: A young and healthy woman is married to a man who had contracted gonorrhea some time previous to their marriage, but of which he was cured before the ceremony. She bears one, two, or three children successively, always making a satisfactory recovery and remaining in robust health. Following a third or fourth pregnancy she develops puerperal septicemia, and is ever afterward a sufferer. It can hardly be contended in such a case that gonorrhea played a very important rôle in the production of the septicemia. Large numbers of women suffering from pelvic inflammatory diseases give practically the same history as this, less the fact that the husband had had pre-existing venereal infection.

Generally, when a woman contracts gonorrhea the first step is the production of a vaginitis. As it is but a short distance from the vagina to the uterus, this is usually quickly traversed. Occasionally there is no vaginitis noticeable, the first lesion being an endometritis. The uterus, in case the infection is of puerperal origin, is the original seat of the attack. Whether or not the disease starts or exists elsewhere, an endometritis eventually develops in every case of gonorrheal or puerperal pelvic inflammation. This fact is important to bear in mind when it comes to the treatment of the disease, both as to prophylactic measures and as to the final cure, even though surgical treatment has been necessitated and carried out. Practically, the mucous membrane of the uterus and the Fallopian tubes is one and the same, the anatomical differences not amounting to more than a change in the character of the epithelium.

The disease has one unbroken line of membrane over which to extend and reach the peritoneal cavity, and it is only a matter of surprise that it ever confines itself to the lining membrane of the uterus. That it does so in many cases is, however, beyond dispute. If the infection be confined to the uterine body, the dangers of a peritonitis are very small, as the chances of the poison being carried through the uterine walls by way of the lymphatics is not great. The extension is nearly always by way of the Fallopian tubes, the exceptions to this being found amongst the puerperal cases; and even here an example is rarely met. In such cases we would naturally expect the cellular tissue about the uterus to become first affected and to undergo suppuration. As a matter of fact, such conditions rarely exist, the cellulitis being almost universally secondary to the inflammation of the peritoneum.

One of the many proofs that the infection has proceeded directly from the tube itself, and not from the uterus by way of the lymphatics, is that it is rare to find traces of inflammation in the shape of adhesions on the anterior surface of the broad ligament, between this structure and the bladder. The evidences of the infection are almost universally found on its posterior surface, between the ligament and the sacrum. This would seem to be accounted for by the anatomical position of the tube and ovary on the posterior surface of the broad ligament.

The more virulent the infection and the more rapidly it extends, the greater will be the chance of its reaching the peritoneal cavity through the open fimbriated end of the Fallopian tube; the greater, in consequence, will be the destruction to the various organs, and the more will be the chance of a fatal termination.

As the infection extends from the uterus, it spreads at once along the mucous membrane of the Fallopian tube, out of its fimbriated opening directly on to the ovary and into the pelvic peritoneum.

Pathological Anatomy.—The inflammation engendered by the infection, whatever it may be, is in all respects the same whether confined to the Fallopian tube, the ovary, a part or the whole of the pelvic peritoneum and cellular tissue, or to the whole abdominal cavity. It is simply a question of anatomical limitation, the extent of limitation being determined by the character of the infection, its virulence, and the ability of Nature to quickly meet and confine it within a limited space. Usually, Nature is capable of meeting the invasion more than halfway, and she not infrequently shuts off the most important avenue of approach to the pelvic cavity by firmly sealing the fimbriated openings of the tube. If she be successful in accomplishing this, there is no very great danger that the inflammation will pass through the walls of the tube, and thus infect the pelvic cavity to more than a limited extent. The possibility of this must be borne in mind, as undoubtedly the inflammation has spread in this manner, but only, however, in particularly virulent cases. Such instances are the exception rather than the rule.

Whatever be the source or cause of infection, the results are the same up to a certain point, as in all inflammations. The moment the tissues are involved, there occurs first a congestion, followed rapidly by effusion. Resolution may or may not follow later in the progress of the case; the rule is that it takes place to a greater or less degree. If resolution does not occur, either organization or suppuration is the final step. Whether the inflammation be a superficial one, involving only the mucous membranes of the Fallopian tube or the serous membrane of the pelvic cavity, or whether it will extend into the deeper structures of these parts, will depend in great measure on the virulence of the attack and its rapidity of advance. For the most part, the disease invades, to a greater or less extent, the connective tissues: as a matter of actual fact, few cases of salpingitis and peritonitis exist without some involvement of the deeper and looser tissues. The exudation occurs in two places: on the surface of the membrane and into the underlying connective tissue. In the Fallopian tube the mucous membrane excretes serum which collects and dilates the tube-cavity. This fluid is liable to either discharge itself into the uterine cavity through the uterine opening of the tube, or into the pelvic cavity through the fimbriated opening, or it may be retained and accumulated in consequence of both these openings becoming closed by the inflammatory process. Whether retained or not, it is extremely liable to undergo suppurative changes and terminate in pus-formation. Should this material empty itself into the uterus, it will drain into the vagina, and will be eventually disposed of in a comparatively harmless way. If it remain encysted in the Fallopian tube, we will have formed either a hydrosalpinx or a pyosalpinx; most usually the latter. The amount poured out is variable, depending upon the irritating properties of the infection. Should it discharge itself into the pelvic cavity, whether it has undergone suppurative changes or not, it is liable to set up an inflammatory condition of the pelvic peritoneum, even though this membrane be not already involved. The exudation into the connective tissue also varies in degree and kind. The greater the exudation and infiltration of inflammatory cells, the thicker and denser become the tube-walls. So thoroughly, in fact, may the walls be penetrated by the inflammation that the peritoneum covering them may become involved. The infiltration may subsequently become absorbed; it may remain and undergo partial organization or it may take on suppurative changes. Frequently, when to the naked eye a Fallopian tube appears to be perfectly free from suppuration, the microscope will show indubitable evidence of the infiltration of pus-corpuscles into its walls. This may, and does, frequently extend to the degree of rendering all the involved tissues so thoroughly friable as to cause them to break down under slight manipulation or under the pressure of a ligature. A ligature will at times cut through such tissue like a knife, the blood-vessels alone offering any great resistance, and even these give way in many instances. It is not at all unique to see the suppurative process extend so far that pus may readily be extruded from the cut surfaces of the walls of the thickened and diseased tube. Should the infiltrating products of the inflammation not be absorbed, they may leave the tube in a permanently thickened and hypertrophied condition. There will result in this case an enormous overgrowth of the connective-tissue elements, with a possible permanent infiltration of inflammatory cells. Where the disease in the tube has extended to either of the above conditions, the peritoneum will have become sufficiently involved to throw out plastic lymph, which will undergo partial organization and form adhesions. Should the attack prove a mild one, in all probability the exudation will be absorbed and the case progress toward a complete cure. At times, where the disease in the uterus is quite severe, it will stop short of an inflammation in the tube, and after existing for a time as a congestion may gradually disappear altogether. It is no infrequent thing to find at the time of an operation that the uterus is badly diseased, and the tube is only, as yet, greatly swollen and deeply congested, but without showing any signs of infiltration. So also with the peritoneum. A badly crippled tube may exist, the fimbriated end becoming closed and adherent to the ovary, with the tube-cavity distended by a muco-purulent serum. The serous membrane may be simply congested, with no excretion of lymph, no adhesions, no true inflammation. The removal of the tube with its contained source of infection and irritation .is amply sufficient to put a stop to further advance of the disease: before the patient is recovered from the operation all traces of the peritoneal congestion will have disappeared.

Should the inflammation have spread from the tube to the pelvic cavity, either by the extension of the disease from the tube through its fimbriated opening or by the subsequent pouring out of the excreted tubal serum, which has undergone muco-purulent changes or not, or by direct extension through the walls of the tube itself, the disease takes on exactly the same form as it would in any other serous membrane, differing only in so far as the anatomical features differ. The pathology of peritonitis is like that of inflammation of other serous membranes—first, congestion, then transudation of blood-serum, and, finally, an exudation of plastic material. Should resolution take place, these inflammatory products are disposed of by absorption of the serum and organization of the exudate. Organization simply consists in the development of the circulation in the exudates sufficient to prevent their degeneration. Should this not occur, they usually break down into suppuration. The exudation of the serous membranes assumes one of three forms: *fibrinous, serous*, or *suppurative.*

In the fibrinous form, should two opposing surfaces touch one another, they will almost certainly become adherent until such time at least when the lymph becomes absorbed. If it does not disappear finally by absorption, permanent adhesions result, more or less dense and well organized in accordance with the original amount of lymph excreted and the activity of proliferation in the underlying endothelial cells of the serous membrane. The more extensive the involvement of the peritoneum, the more extensive will be the resultant binding together of its various surfaces. Should the exudation prove to be of the serous variety, adhesions are much less apt to form. Varying quantities of free serum, in a more or less changed condition, will be found in the pelvic cavity, and the serous surface will most likely be covered with flakes of lymph. The suppurative variety is simply an advanced stage of either of the other two. As to whether or not suppuration occurs, depends, again, upon the character of the infection. Occasionally the infection is so virulent that the case has progressed to a fatal termination before suppuration has had time to occur.

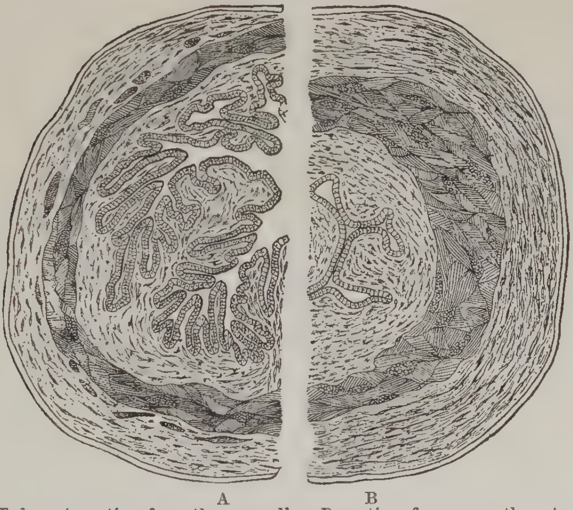
Should the inflammation involve the deeper tissues, as is almost always the case, effusion takes place into the cellular tissue. The extent to which this will occur is dependent directly upon the activity of the advancing inflammatory process. At times the effusion is slight in quantity, and causes but little distension of the loose areolar tissues; in other cases so much effusion is thrown out as to distend the connective tissues to their fullest extent. The greater the amount of effusion, the more hard and board-like will the part appear to the touch on a local examination. Should the case progress favorably, there will eventually be an absorption of these inflammatory products and the parts will return to a condition of health. Should anything supervene, on the other hand, to prevent Nature from absorbing and disposing of this serum in the ordinary way, it becomes denser and apparently makes an effort at organization. If infective germs should reach it from any direction, suppuration will take place and all hopes of a spontaneous cure will be lost, except through a prolonged and extremely hazardous illness. The extent of the suppuration does not altogether depend upon the extent of the infiltration, for the reason that after this process has progressed to the limits of the effusion it very frequently continues on, involving the healthy connective tissue, step by step, until eventually it may involve most of the connective tissue of the pelvis, and has even been known to discharge at the umbilicus.

Except in a limited number of puerperal cases, the course and termination of a septic or specific inflammation of the uterus are as described. The few exceptions to this rule occur, as has been said, in puerperal patients. A woman contracts septicemia after childbirth or abortion, by having septic germs introduced into the uterus. The amount of septic material which will be necessary to contaminate a woman under these circumstances will probably be such as would have no effect whatever upon a healthy non-gravid womb. After the placenta has been removed there is left, to all intents and purposes, an open wound, or what would be an open wound were it on any of the skin surfaces of the body.

The incidental wounds due to traumatism add another element to the dangers of this variety of infection. The placental wound is peculiarly liable to pathological changes, for the reason that it is difficult of access and treatment, such as a similar wound elsewhere would receive. Again, the torn ends of the hypertrophied vessels and other tissues are disposed of by a process of degeneration which borders closely upon the pathological—a physiological process which the slightest amount of contamination by septic matter will change into a pathological one. Should such a wound once become septic, the enormously enlarged lymphatics stand ever ready with their gaping mouths to receive and convey into the deeper tissues the products of the suppuration. One would imagine, with the frequency of the occurrence of puerperal septicemia, that this condition would result frequently, when, as a matter of fact, it is the exceptional occurrence. If the septic products are taken up by the lymphatics, the chances are largely that they will be conveyed into the blood without any particular involvement by the inflammatory process of the walls of the lymphatic vessels or of the connective tissue binding them together or through which they pass. At times, however, some additional element seems to be introduced which causes the inflammatory process to pass rapidly along and about the walls of the vessels and lymphatics directly into the surrounding connective tissue, thus conveying the septic material primarily into the connective tissue and rendering any peritonitis which may follow secondary to the cellulitis. The fact of the existence of this class of cases (although of great rarity) does not detract from the statement that in the vast majority of cases of pelvic inflammation the cellulitis is secondary to the peritonitis, and is consequently of only comparative importance. Usually the treatment directed toward the cure of the peritonitis accomplishes also that of the cellulitis.

Results.—The results left in the train of an inflammation beginning in the uterus, extending into the Fallopian tubes, and from thence into the pelvic cavity, are widely variable. In the tube they extend from a slight salpingitis to a pyosalpinx; in the peritoneal cavity, from a mild attack of local peritonitis to a general suppurative peritonitis and cellulitis; in the ovaries, from a simple ovaritis to an ovarian abscess. In the milder forms of salpingitis the disease assumes the catarrhal type. Here the inflammation is confined almost, if not entirely, to the mucous membrane lining the Fallopian tube, there being oftentimes an accompanying congestion of the other constituent parts. The cause of the tubal involvement is always resident in the uterus, usually in the shape of an endometritis, and occurs by direct extension from one mucous membrane

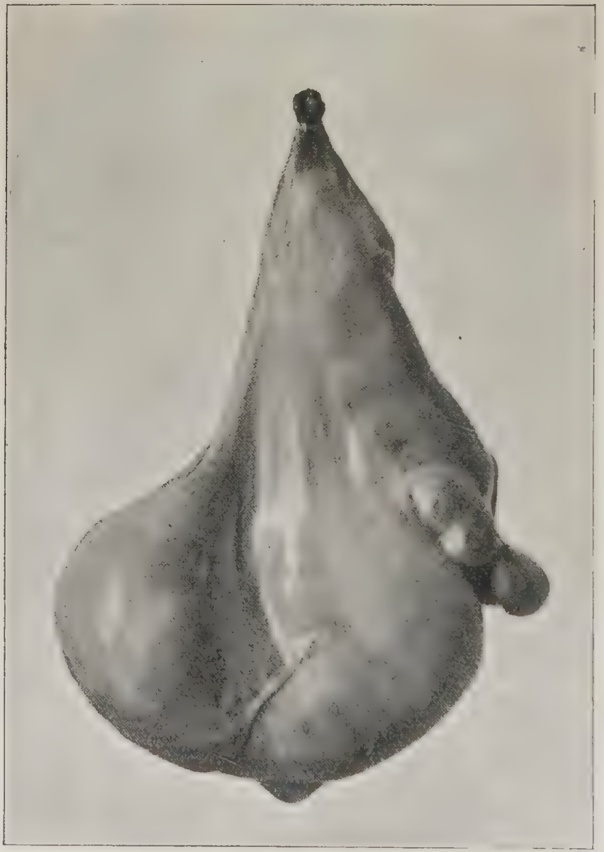
FIG. 298.



Normal Fallopian Tube: *A*, section from the ampulla; *B*, section from near the uterus. Layers of the Fallopian tube: 1, upper and outermost layer, serous coat; 2, layer of loose connective tissue, richly supplied with blood-vessels; 3, muscular coat, much thicker near the uterus than near the ampulla. It is principally made up of circular fibres. Above and within it is reinforced by longitudinal fibres, some of which spread into the mucous layer; others (the most external) penetrate between the layers of the broad ligament; still others go to the hilum of the ovary or are prolonged to the fundus of the uterus; a few fibres penetrate to the inner layer. 4, mucous coat. The framework of this layer is embryonic connective tissue, rich in fusiform cells; it projects into the lumen of the tube in longitudinal folds which have been cut through obliquely in the section shown above. Near the uterus these folds are radiating, and give a star-shaped appearance to the lumen in the section. Near the ampulla they are longer and reduplicated, giving the lumen a jagged or toothed appearance on section. The whole surface of the mucous membrane is lined with simple columnar ciliated epithelium; the movement of the cilia is in the direction of the uterus.

to the other, the disease in the tube not always being so severe as that in the endometrium. The process exists in both an acute and a chronic form. Neither gives rise to any particular symptoms other than indirect ones, such as sterility. The acute form may run its course rapidly and be spontaneously cured, or may subside as the endometritis is relieved. On the other hand, it may continue on indefinitely, and finally become chronic. During the existence of the inflammation, especially in the acute form, an excess of sero-mucous products is thrown out. Where there are no adhesions found, but the uterine and fimbriated ends of the tube remain patulous, these products are drained either into the uterine or pelvic cavities. Should their openings become occluded from any cause, as is at times the case, the sero-mucus accumulates, distends the tube, renders its walls thin, the tube becoming larger and larger as

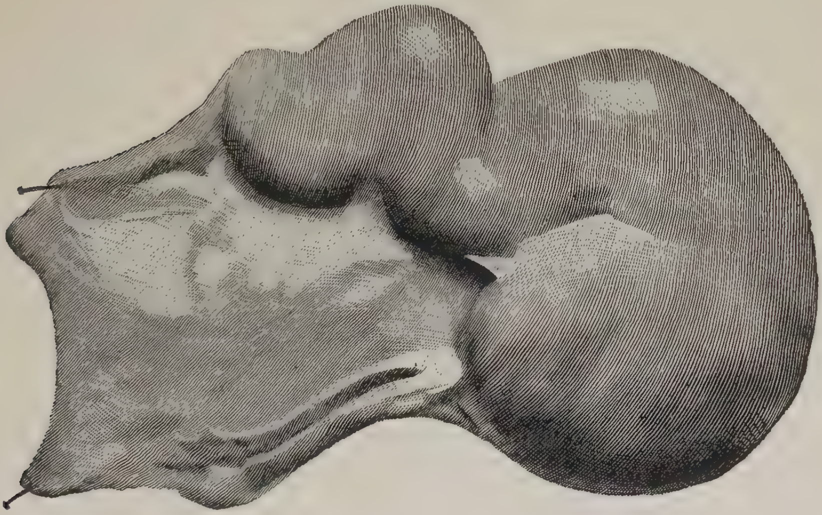
Fig. 299.



Hydrosalpinx.

the contents increase. The condition is then known as hydrosalpinx. The very mild cases seldom terminate in this manner, for the reason that there is not sufficient active inflammation to cause occlusion of the tubal openings. Where a hydrosalpinx exists, it is often found to be adherent to surrounding parts. The fact of the presence of a healthy, non-inflammatory tumor of reasonable size being present in the pelvis is not in itself sufficient to account for inflammatory processes arising in its peritoneal lining. Either the original inflammation, slight as it may be, has spread through the walls of the tumor, which have become much thinned, or there has been leakage of some of the tube-contents, which are acrid and irritating.

Fig. 300.



Hydrosalpinx.

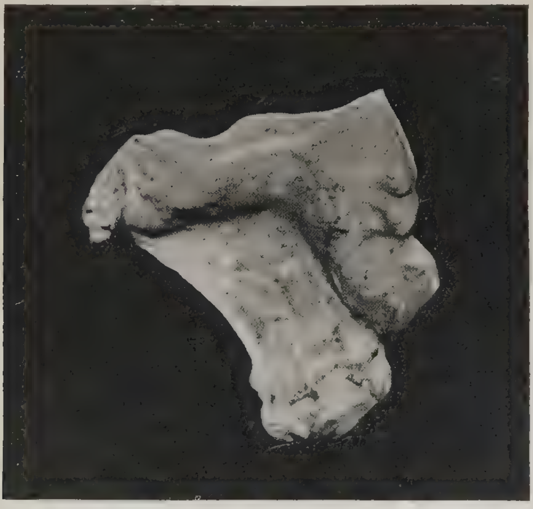
Should the inflammation become a chronic condition, which is the more usual procedure, the result is more apt to be a destruction of the ciliated epithelium lining the tube, and a consequent permanent crippling of that organ for its legitimate functions. The desquamation of the epithelium is also claimed to be a sequel of the exanthematous disease. To how great an extent this is true is uncertain. There is not the slightest reason why this mucous membrane should be more affected than that of other parts of the body. Where there has been a general and undoubted involvement of all the mucous tissues in the body there is no reason to expect that this particular one has escaped. Otherwise, the cause and effect of these diseases are extremely problematic. It is this desquamation of the ciliated epithelium in the catarrhal salpingitis which is in great measure responsible for a large proportion of cases of sterility and extra-uterine pregnancy. The normal function of the ciliated epithelium is to carry all the tube-contents toward the uterus. If in consequence of its destruction the ovum is retarded in its progress until the spermatozoid is too enfeebled to perform its function, or if the ovum simply lodges in the tube and there loses its vitality, sterility must of necessity follow. Again, if the discharges from the altered and diseased mucous membrane are acrid and acid, neither the ovum nor the spermatozoid can survive, or at least they are so enfeebled when they meet that they fail to unite, or if they unite, fail to accomplish their destiny. Should the calibre of the tube be closed at any point throughout its extent, of course an insurmountable mechanical obstruction exists which it is impossible for either element to overcome. If the male and female elements should meet in the tube and the ovum become fecundated, the product of conception is very apt to lodge at some point along the course of the tube and continue its development.

Occasionally the inflammation of the tubal membrane assumes the hemorrhagic type and the excretions are mingled with blood. Provided these muco-bloody discharges empty themselves into the uterus, there will be no more difference in the result than if the excretion were merely mucous or serous. If adhesions close the ends of the tube, it becomes distended with the contained fluid, as in hydrosalpinx, and is then known as hematosalpinx. This occurrence is infrequent as compared with the formation of hydrosalpinx.

When the infection is more severe and extends into the Fallopian tube from the endometrium, involving almost simultaneously all the layers of the tubal wall, the resultant condition is more important as well as more dangerous. Exudation takes place into all the coats of the tube, and the inflammation extends even to the peritoneum. The openings into the tube may become closed or may remain patulous; usually they are occluded. The inflammatory products in the walls of the tubes increase. The walls vary in thickness in accordance with the amount of infiltration, in particularly bad cases being from a quarter to half an inch thick. Attempted organization may take place, the result being the production of an overgrowth of the connective-tissue elements, giving the tube a greater or less consistency. The products of inflammation thrown out by the mucous surfaces are either discharged through the tubal openings or, if the openings are not patulous, are absorbed. The inflammatory products thrown out on the peritoneal covering of the tube assume the form of plastic lymph, and cause the tube to adhere to any other peritoneal surface it may touch. The tube itself adheres commonly to the uterus, broad ligament, and ovary: the fimbriated end usually grasps the ovary tightly, and the fimbria themselves may become destroyed by the disease.

This condition presents the disease known as chronic (adherent) salpingitis. It must be borne in mind that this condition is distinctly different from those forms of pure chronic catarrhal salpingitis in which the inflammation affects only the mucous lining of the tube, and results simply in a permanent alteration of that membrane, without particularly affecting the walls of the tube or its investing peritoneal covering.

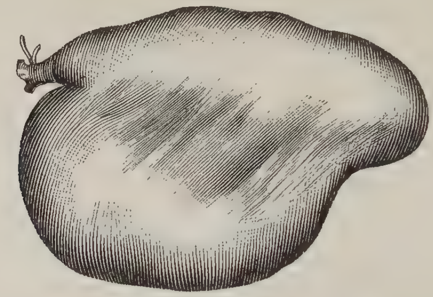
Fig. 301.



Chronic Interstitial Salpingitis and Ovaritis, with thickened broad ligament—so-called cellulitis.

Chronic interstitial salpingitis is nothing more or less than the mildest form of the same condition, which frequently progresses to the development of a pyosalpinx. If there be good drainage of the tube, there is not much danger of muco-purulent material accumulating. There may, it is true, be a certain amount of suppuration taking place, even the walls of the tube becoming involved. The result under these circumstances would be in accordance with the patency of the tubal canal. If the canal remains patulous, the only additional harm will be the breaking down of the inflammatory products infiltrating the walls, and the consequent rendering of these friable, if they do not actually suppurate. This same process may extend on into the lymph thrown out by the peritoneum, and cause the adhesions to become friable or even to suppurate.

FIG. 302.

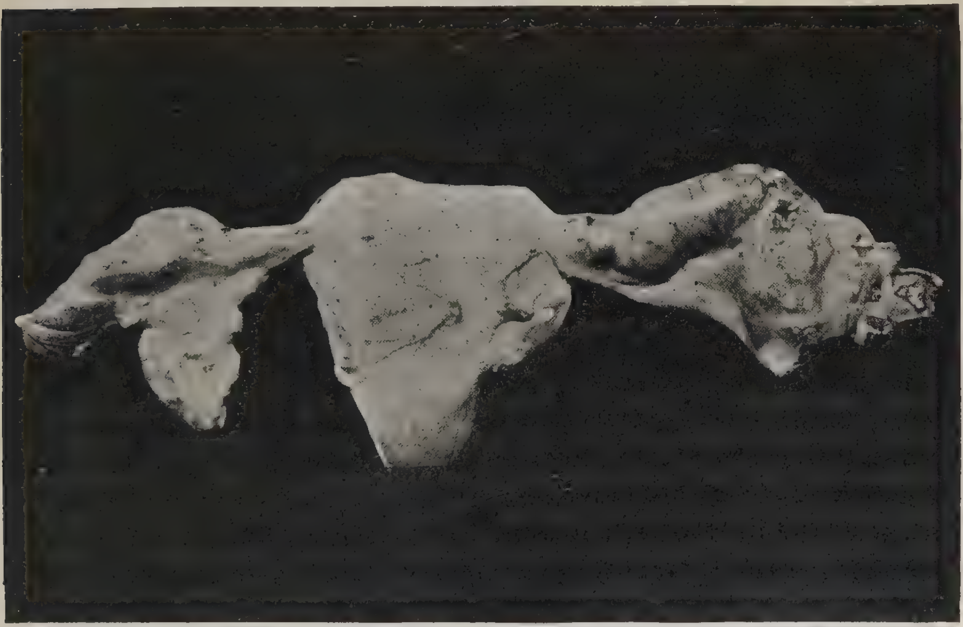


Fallopian Tube and Ovary, showing adhesions.

Should suppuration occur, inflammatory products within the tube may drain away into the uterus, and the suppurative process finally cease, leaving the tube in its crippled adherent condition. The uterine opening will remain patulous long after the fimbriated opening is closed and the fimbria destroyed, for the reason that the peritoneum is much more delicate than the endometrium, and the irritation of the advancing suppuration will cause it to early throw out protective lymph, which will effectually seal the opening and protect the peritoneal cavity. The suppurative process may keep up indefinitely, the tube constantly discharging its muco-purulent contents into the uterine cavity and thence into the vagina. This is of no infrequent occurrence. The uterine opening may even become closed by light friable adhesions, the tube distend with its suppurative contents, until either the pressure of the over-distension causes the adhesions to give way or they break down from suppurative changes, the result in either case being a periodical discharge of pus from the tubes. The tubal openings usually become permanently closed by adhesions. If the tubal contents are small in quantity, they may eventually become absorbed; but this cannot be a common termination. It is not of infrequent occurrence to find the Fallopian tube distended with a broken-down, cheesy material. In these cases the watery elements of the pus have been absorbed, and the solid portions have undergone a caseous degeneration. Such conditions are very apt to be due to tubercular changes. Were the constituent tissues of the tube healthy, there would be more probability of complete absorption. In the cases under consideration all the parts of the tube are so diseased and disorganized that their functions are for the most part suspended. However, certain cases are met with clinically in which no other interpretation is possible, and it may be put down as one of the probabilities.

When the contents are not absorbed, a true pyosalpinx results. The tube becomes distended with a greater or less quantity of pus or muco-purulent matter. In such cases the inflammatory infiltrates in the tube-walls have most probably shared in the suppurative changes, rendering the walls soft and cheesy; the microscope will show them filled with pus-corpuscles. The peritoneal serum and lymph do not escape the suppurative changes. The pus may have worked its way directly through the tube-wall, and then infected the lymph, or the infection may have passed through the fimbriated opening of the tube, and in this manner contaminated the peritoneal elements. Small abscesses frequently result, in con-

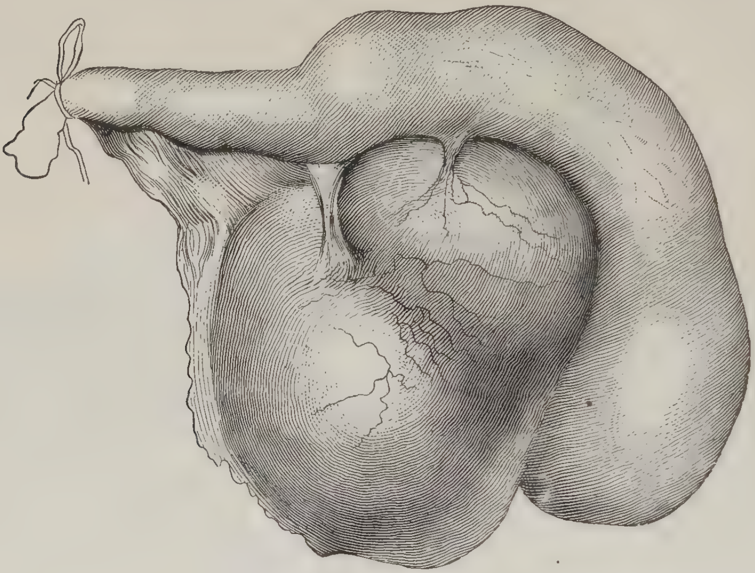
Fig. 303.



Double Pyosalpinx and Diseased Uterus, removed by Supravaginal Hysterectomy.

sequence, in the midst of the adhesions, and on removal of the tube by abdominal section these abscesses, which are as often as not multiple, are opened, their contents soiling the field of operation. If the pus has passed directly through the tube-wall, these small local abscesses will probably be the worst result. Should the infection pass out through the fimbriated opening, however, it may spread rapidly to the whole pelvic or abdominal cavity, and end in a general suppurative peritonitis. The reason of this difference is that when the suppuration extends through the tube-walls it never enters the general peritoneal cavity, but always meets the obstructing lymph which the peritoneum has had plenty of opportunity to throw out about the threatened point. This same obstruction is most always met with at the fimbriated opening, in which case the result is the same; but occasionally the infection itself travels along the tubal mucous membrane so quickly that it has time to escape before it can be closed in by the peritoneal lymph.

Fig. 304.



Pyosalpinx and Ovarian Abscess.

When the infection has once passed beyond the fimbriated opening of the Fallopian tube, it attacks either the ovary, the pelvic peritoneum, or both. Should it confine itself to the peritoneal investment of the ovary, it causes excretion of lymph, which binds that organ to the tube. The fimbriated end of the tube becomes firmly attached to the ovary, not infrequently an abscess developing at the point of junction, which is known as a tubo-ovarian abscess. Should the infection penetrate the outer coat of the ovary or infect a ruptured Graafian follicle, an abscess will begin and form in the ovarian stroma which may eventually reach even the size of an orange. Such an ovary is, as a matter of necessity, on account of the involvement of its peritoneal covering, densely adherent to all peritoneal surfaces which come in contact with it. Where there is no infection, but where the inflammation spreads from the tube and involves the ovary, this organ takes on changes of an interstitial character, which eventually cause such a destruction that there is left little of the healthy ovarian stroma. At times these organs assume much the character and appearance of hypertrophic scirrhosis; at others, an atrophic condition. In either case the function of the organ is much changed, even destroyed, and the ovary is most likely to give rise to very distressing symptoms.

The infection may pass along the Fallopian tube and infect the ovary, even to the extent of forming an ovarian abscess, without leaving behind more than a catarrhal condition in the tube. When the infection invades the peritoneum, it remains often a local affection, but in a reasonably large proportion of cases spreads until it invades more or less the whole of the pelvic peritoneum. It may, in fact, continue and develop into a general abdominal peritonitis. In attacking the peritoneum any one of these forms of peritonitis are likely to develop: the fibrinous, the serous, or the suppurative. The fibrinous variety is by far the most frequent form accompanying inflammatory diseases of the Fallopian tubes and the ovaries. The serous variety is most likely to be of the nature of that peritonitis which so often follows the performance of a cœliotomy; it runs its course usually in three or four days, and most generally ends fatally. It may, as a matter of fact, occur under any source of infection. The lesions in such a case, on examination, will be found to be universal but light adhesions between all the coils of intestines located in the pelvic cavity, as well as of all the pelvic contents. After the various organs are separated a few ounces of bloody serum will be found in the pelvic basin, and the peritoneal surfaces will be observed to be covered with flakes of lymph. The process has been too rapid for the formation of pus in many instances, and as a rule there is not a great deal of involvement of underlying connective tissue. The fibrinous variety is the common one. The irritated and inflamed serous membrane begins at once to develop that great protector, lymph. This material precedes the infection, and, unless the advancing inflammation is too rapid, bounds it within certain limits. Frequently it confines the inflammation to the serous covering of the tube itself. The inflammation may have advanced further and involved the serous covering of the ovary and the broad ligament.

As the inflammation advances step by step it is continually met by the obstructing plastic material which the threatened and irritated peritoneum is throwing out for its protection, until, having spent its forces, it makes less and less effort at advance, and finally settles down within the limits into which the lymph has been able to confine it.

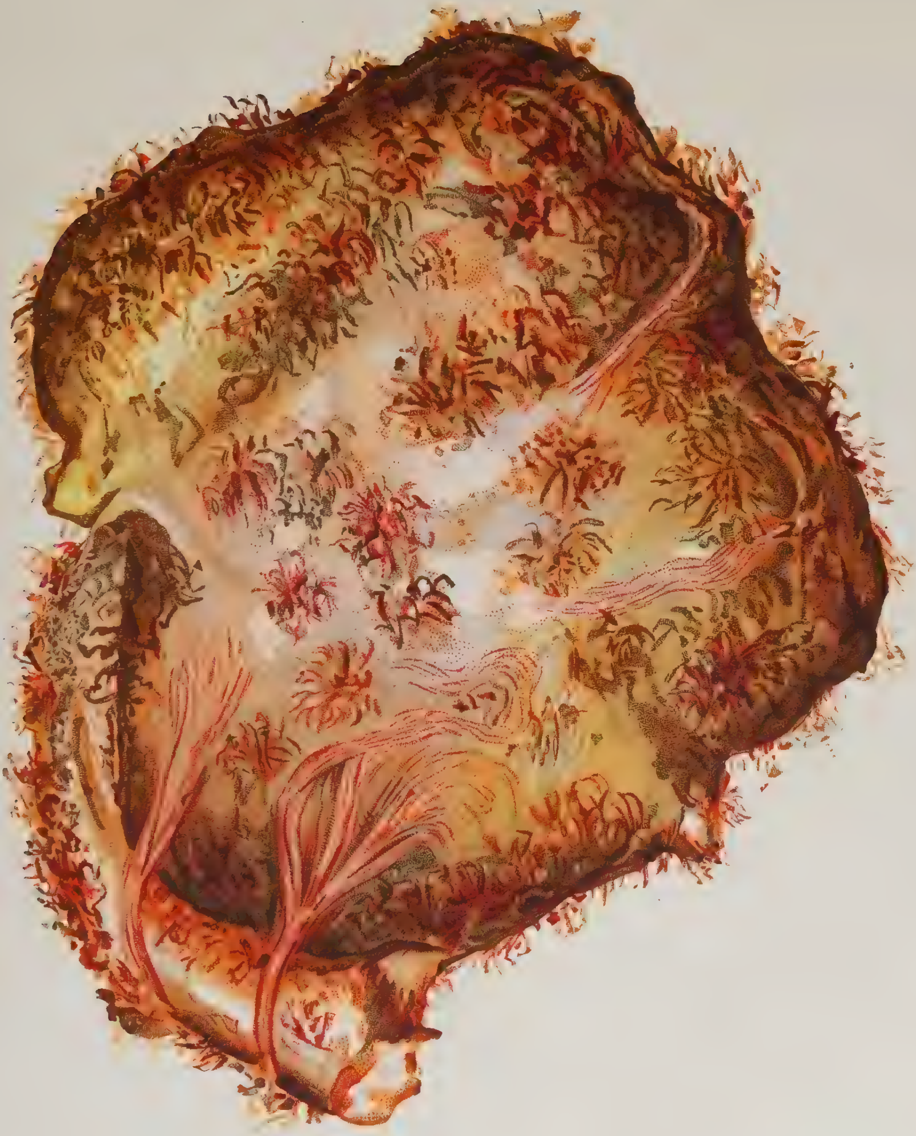
The extent of the destruction will have depended much upon the rapidity of the advance and the virulence of the infection. The lymph may have succeeded in confining it to the immediate neighborhood of the diseased Fallopian tube and ovary, or the inflammation may have spread to the whole of the pelvis, or in extreme cases to the general abdominal cavity. The inflamed peritoneal surfaces, wherever they come in contact, become glued together by the lymph. By the time the inflammatory forces have spent themselves, the serous membrane is infiltrated with the inflammatory products, resulting in its becoming thickened as well as being covered with lymph.

Should the case terminate in the most favorable manner, all the lymph and other inflammatory products would become partially absorbed, and the other parts return once more to a comparative condition of health. It is at this point that electricity has gained its greatest reputation. The lymph exists in considerable masses, and, as Nature begins to get rid of this accumulation, electricity comes in as an extra spur to hurry Nature's work. The result is in many cases a quicker absorption and an apparent cure, the facts being that the gross amount of lymph has disappeared, but the disorganized and adherent appendage remains, ready to relight the original inflammation upon the slightest provocation.

The fact is notorious that these chronic conditions are liable to repeated recurrent acute exacerbations of inflammation.

The more usual result, however, of such an inflammation of the pelvic peritoneum spreading from the Fallopian tube is to cause a broken-down and destroyed tube and ovary; both become enlarged,

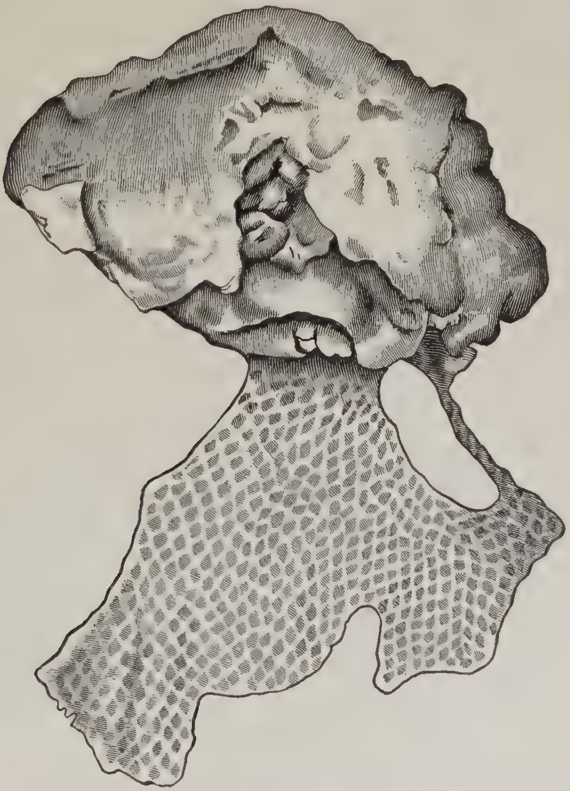
PLATE XXX.



Pyosalpinx and Ovarian Abscess, showing the remnants of universal adhesions.

heavy, prolapsed, and adherent to each other, the broad ligament, the uterus, and the pelvic walls. One step further, and the superimposed intestines and omentum are involved, and become adherent on top of the diseased and adherent pelvic organs. At times there is no pus complicating the general destruction; at others pus is found in the Fallopian tubes, the ovaries, in the midst of the adhesions in which these organs are imbedded, or filling the whole pelvis. The Fallopian tubes themselves are so distorted that numerous separate pockets of pus are found in a single tube. As many as three such collections have been found in the same tube, each of which contained a distinctly different variety of pus. As many as half a dozen different foci of suppuration have been found in the midst of the adhesions, and in a single Fallopian tube, all separate and unconnected with each other.

Fig. 305.



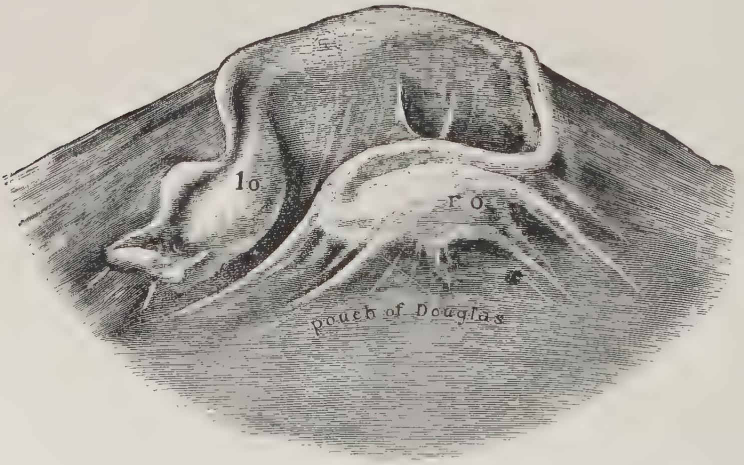
Broad thin Band of Adhesions (spider-web) hanging from an Adherent Ovary and Fallopian Tube. (Drawn from photograph.)

Should the infection not be virulent enough to cause suppuration of the serum and lymph, this latter substance will undergo organization to a greater or less extent, with the result of leaving the surfaces which have come in contact permanently adherent. The adhesions thus found are variable in kind; clinically at least four varieties are recognized.

The Fallopian tubes, ovaries, and uterus, one or all, may be covered over with a thin layer of false membrane, well organized and not at all unlike a spider-web, when spread out and held up to the light. The variety has well been called the "spider-web adhesion." The membrane is easily torn to pieces and destroyed if the finger is pressed through it while it is on the stretch. If, in attempting to break through, it is allowed to gather itself together like a bundle of sticks, it forms long shreds of adhesions which are exceedingly hard to tear, and in the tearing of which an intestine or bladder may easily be badly injured, its walls giving way at the point of the adhesions. They are the more difficult to deal with inasmuch as the organs are usually movable under them, and it is hard to get any fixed point from which to break through.

The next variety is that where any or all of the pelvic organs become fixed in the lymph in much the same manner as if they were set down in a bed of plaster of Paris. The lymph organizes and from it is formed a new and apparently real peritoneal covering. Clinically, to the touch, the organ feels as though it had been congenitally developed in its displaced and distorted position. In

Fig. 306.



Ovary Displaced and bound Down in the *Cul-de-sac* by Adhesions—adhesions of the spider-web variety, similar to those shown in Fig. 305: *ro*, right ovary; *lo*, left ovary.

the case of the ovary the ovarian ligament is destroyed; where the Fallopian tube is involved the broad ligament has, to a greater or less extent, disappeared. The organs are immovably fixed, and can only be torn away from their position by an absolute enucleation, there being practically no pedicles to deal with: to all intents, the mass removed is a sessile growth, and must be dealt with as such. The cases in which this condition is found are usually old chronic ones.

The ordinary adhesion met with in the course of operations is what one might call the "bread-and-butter" variety. After the adherent surfaces have been freed from each other the appearance is not unlike the surface of two pieces of bread and butter which have been placed together as in a sandwich and separated. These adhesions are more or less firm as the case is an acute or chronic one. At times they are so solid that it is necessary to take the handle of the scalpel or other instrument in order that they may be safely separated; in other cases the finger will readily destroy them. Should the lymph going to form these adhesions become infected, they become more or less broken down, and are proportionately easy to deal with. This forms the fourth variety as seen clinically. Naturally, the only pathological difference between at least the last three varieties is the difference in the extent of involvement and organization. They all begin by the affected organs becoming imbedded in a quantity of plastic lymph. This lymph organizes or is partially broken down by the infectious poison. If it breaks down and fails to organize, the last clinical variety is produced. This variety usually accompanies acute pus-tubes. Should it fail to do more than make an attempt at organization, the adhesions will go to make up that variety which is the most common, the "bread-and-butter" variety, which generally accompanies chronic (adherent) salpingitis. It is almost always possible in enucleating the organs in such a case to find the broad and ovarian ligaments and use them as a pedicle, although at times they are much shortened. If the case runs on into a chronic form, either of the last two varieties may develop, by absorption of the degenerative elements and by organization and contraction, into those varieties which resemble so much congenital conditions.

Finally, the lymph may break down into suppurating foci at one or more points, local abscesses being the result. These abscesses, being bounded by adherent lymph, are for all practical purposes extraperitoneal, and yet they are as truly, from an anatomical point of view, intraperitoneal as if they were not limited at all. As a matter of fact, they exist from cavities as large as a pea to abscesses filling the whole of the pelvis, and only being shut out from the general abdominal cavity by the intestines and omentum at the pelvic brim, becoming involved in the advancing inflammation, lymph being thrown out, and these organs becoming firmly adherent over and about the pelvic inlet.

Unless the attack has been a mild one, the connective tissue immediately underlying the peritoneum is apt to become involved in the destruction. So intimately connected are the two structures that where the one is affected by such a serious process it can readily be understood why the other also becomes involved. As soon as this loose areolar tissue is invaded, the products of inflammation are thrown out into its meshes, and the parts affected become much thickened. The connective tissue of the broad ligament and that underlying the peritoneum which lines the pelvic floor are most apt to be affected. The infiltration, as usual up to a certain point, attempts to undergo organization, but mostly fails. It is either absorbed or suppurates.

Should it become absorbed, it would do so in conjunction with the absorption of the inflammatory products in the peritoneum and in the line of progress toward the cure of the whole pelvic inflammation. If organization partially occurs, a contraction of all the tissues takes place, with the result in some cases of almost total obliteration of the ligaments and contained connective tissue. This is the condition which has existed in those cases of prolapsed and adherent tubes and ovaries, where the ligaments have almost, if not entirely, disappeared and the organs remain practically as sessile masses. Cellulitis is essentially an acute or subacute as well as a secondary disease. It rarely occurs in the pelvis as a primary disease, and is just as rarely found as a chronic condition, except in the form of an abscess, which is not common. The abscesses and masses in the pelvis formerly looked upon as cellulitis are almost without exception contained within the peritoneal cavity; where the abscess does exist in the cellular tissue, it is generally an extension from a focus of suppuration in the peritoneum. It is said that in acute puerperal cases the infection, at times, extends by way of the lymphatics directly into the cellular tissue, and results in the formation of a true cellulitis and a true primary cellular-tissue abscess. Examples of such cases have from time to time been placed on record by reliable authorities, but they must be of exceedingly rare occurrence, as the writer during the course of many hundreds of cœliotomies has failed to find a single example of the condition. In no case, except in suppurating cysts, has a pelvic abscess been observed which was not intraperitoneal, in the sense that it had originally developed in the peritoneal cavity.

These pelvic abscesses, whether of peritoneal or cellulitic origin, are extremely apt to burrow their way to the surface and discharge their contents in a more or less irregular manner. They have been known to empty themselves into the rectum, vagina, and bladder. The umbilicus, the saphenous opening, the pelvic floor, the labia, the pelvic foramina, have all served as means of passage for the pus. Cases have even been reported where the pus has burrowed through the connective tissue to the iliac fossa, and from thence to the diaphragm, finally rupturing into the lung. The spontaneous evacuation of pus by any of these sources, although a proportion of such cases go on to a good recovery, is a disaster, and the danger of such a result is one of the clearest of indications for the adoption of vigorous measures to ensure its prevention. The usual course of a case after such a mishap is a prolonged convalescence—just as commonly a long invalidism, followed by death. The sinus-tracks are long and irregular, and the abscess-cavities very incompletely drained. In the case of the rectum and the bladder the cavity is continually contaminated by the contents of these organs, and an already bad condition is rendered worse.

Symptoms.—These vary in accordance with the anatomical parts attacked and the intensity of the inflammation.

The amount of suffering incurred by the patient will vary from a matter of slight discomfort to agony which is quite beyond description. There is no death from which a woman may die which is, in all its features, more distressing than a death from peritonitis, especially an acute septic peritonitis. The symptoms of each of the parts attacked are in many respects similar. The involvement of almost all the tissues of the pelvis follows as a complication wherever the brunt of the attack may fall. In other words, one tissue is seldom involved without all being more or less included; consequently the symptoms which would be induced by the attack of one tissue are present at the same time with those which would be induced by the involvement of any or all the other tissues.

There are three symptoms which are present in greater or less degree in almost all, if not quite all, cases of pelvic inflammations. Pain, hemorrhage, and uterine discharges usually dominate all other factors in cases in which suppuration has not supervened. Naturally, the temperature and pulse play a conspicuous part. When suppuration occurs, all the symptoms of septicemia are added to those already existing. In addition, symptoms referable to special organs and due most frequently to sympathy and reflex influences become at times prominent.

Salpingitis.—In acute or chronic catarrhal salpingitis the symptoms are seldom sufficiently prominent to give rise to any suspicion that there is such a disease present. In the acute form the patient will most probably feel a condition of general malaise, have some backache, with a possible headache; there may be a slight increase of the discharge coming from the vagina. No noticeable change takes place in the menstrual function, for the reason that this is already, in all probability, disordered from a pre-existing endometritis, and the lesion in the tube is too slight to add anything perceptible to the result. If at this time the temperature and pulse should be taken, the one would be slightly elevated, the other accelerated. No doubt in every acute case these symptoms are present to a greater or less degree, but in almost every instance the attack is so slight that it is passed over without notice, and the disease has soon settled itself down into a subacute or chronic form: in this condition the symptomatology is even slighter than in the acute form. The disease is so constantly associated with endometritis, being, as a matter of fact, almost always an extension of the uterine inflammation, that the symptoms of the primary disease are a great factor in obscuring those of the salpingitis. The fact that the disease has existed at all is usually only discovered when its results are made manifest. It is from this form of the pelvic inflammation that hydrosalpinx arises.

Hydrosalpinx.—The distension of the Fallopian tube with serum frequently exists without giving rise to any symptoms whatever. If the resulting tumor is not very large—and usually it does not reach a size greater than that of a Messina orange, although occasional cases are reported of enormous size—there is no particular reason that it should cause any disturbance. When it does so, it will most generally be found that an inflammation, slight or otherwise, has invaded the peritoneum, and that whatever symptoms are present will be due in great part to the local peritonitis. Adhesions may result or not, this being determined by the character of the peritonitis. Should inflammation of the serous membrane complicate the case, it will give rise to pain, either slight or quite severe according to the grade of inflammation and the extent of the adhesions. Leucorrheal discharges are apt to enter as a factor into the case: the discharge is of a whitish character, and seldom if ever assumes a muco-purulent form. Should the discharge be muco-purulent, it is evident that it originates from the endometrial inflammation, and is not merely due to the congestion caused by slight local peritonitis. Menstrual disturbance is apt to be present, as is the case with most examples of pelvic inflammation; the flow is apt to occur too frequently and to be profuse.

Hematosalpinx—Should the exudate from the mucous membrane of the Fallopian tubes take on a bloody character and the openings of the tube become occluded, the result is an hematosalpinx. The symptoms of this disease differ in no way from those of the hydrosalpinx, or those of the adherent salpingitis which will be described later. As in the latter disease, the greatest amount of its symptomatology is derived from the peritoneal involvement, and as the extension of the inflammation to the serous membrane is of about equal occurrence in both, the symptoms are usually the same.

Interstitial Salpingitis and Ovaritis.—The name is given this form of pelvic inflammation for want of a better one by which to designate it. It is meant to include all forms of inflammation of the Fallopian tubes and ovaries, excepting those mild ones described under the name of catarrhal salpingitis and those described under tubercular salpingitis. Leucorrheal discharge will be the first indication of the trouble, and this will be quickly followed by pain. The vaginitis and endometritis which precede the salpingitis will have been ushered in with muco-purulent discharge. These discharges continue when the Fallopian tube becomes involved, and the only difference then to be noted is that there is added to them the discharges from the tubes. This addition is not sufficient under ordinary circumstances to be perceptible. Should the tubal discharges accumulate and distend the tube, it not infrequently occurs that the obstruction at the uterine end finally gives way. and there is consequently a gush of muco-purulent matter from the uterus and vagina. One must be on his guard, however, against this symptom as indicative of an over-distension of the tube and its spontaneous discharge into the uterus. This is presumed to be one of the methods Nature has of curing pyosalpinx, and one which, if we are to believe all the reports in the literature of this subject, is extremely common. There is no doubt but that such a happy termination does occur in some few cases, but their frequency is questionable. The symptom oftentimes only exists in the mind of the attendant and the patient, and is due for the most part to faulty observation. Some slight temporary obstruction arises in the cervical canal, and the discharges accumulate in the uterus, only to be expelled as the patient assumes a favorable position; or, what is more common, there is an accumulation in the posterior cul-de-sac of the vagina, with a subsequent discharge on certain movements of the woman favorable to their expulsion. The symptom is most apt to occur in women who are confined to bed, the recumbent position favoring such a condition. Leucorrheal discharges are common to all inflammatory or congestive conditions of any or all of the pelvic organs. They are therefore not at all diagnostic, and are only of value as corroborative evidence. Their character varies as they are mixed or not with infection. The purely congestive discharges —such, for example, as precede menstruation and accompany pregnancy—are of a milky-white character: those which accompany gonorrheal infection or puerperal septicemia assume a muco-purulent character. It is this latter kind of discharge which almost always accompanies adherent salpingitis. As a matter of fact, it is a combination of the excretions of the tubes, uterus, and vagina, and is made up of the suppurating inflammatory effusions, mucous and epithelial cells. The discharge is frequently acrid, and causes a pruritus of the vulva. Pruritus is not as common a symptom in these inflammatory diseases as we would be led to imagine from the amount of the discharges, their acridity, and the constancy with which they exist. So infrequently does it occur, in fact, that a grave doubt arises as to whether the pruritus is ever due to the discharge. Leucorrhea is as apt to appear in the same amount where the inflammation has attacked the tube alone as where the whole pelvic peritoneum is involved.

Pain is a constant companion of the pelvic inflammatory diseases. It varies in intensity with the tissues involved and the extent of the process. In cases of adherent salpingitis and ovaritis it is usually located in one or both iliac regions, at times extending down the thighs, and is frequently accompanied by backache. It is severe or not as the attack is an acute or chronic one. Its character is variable, from a dull, heavy backache to a sharp, lancinating iliac pain, which does not come and go, but remains, for the most part, constant. Often it is due more to the irritation of the advancing inflammation than to any real involvement of the tubal or ovarian tissues. It is no infrequent thing in gonorrheal or puerperal endometritis to find that the iliac pain disappears after a thorough curettement of the uterus, proving that the inflammation has not yet passed beyond the uterine cavity. The sharp pains are mostly due to peritoneal involvement, and are a fairly sure indication that this membrane has been invaded by the actual inflammation, or at least is irritated by its near approach. The ovarian involvement is, however, responsible for a fair share of the condition. The dull, heavy pains, as the backache, are most probably produced by the infiltration of all the tissues with inflammatory products; possibly some of the elements of the peritoneal pain are added as a factor. Motion or pressure of any kind will aggravate this symptom. An over-distended bowel or bladder gives more or less distress, and the contraction incident to the emptying of either of them causes considerable suffering. Walking, riding, or jarring from any cause calls forth this complaint: even the erect position may be uncomfortable or unbearable.

Menstrual disturbances are universal. As a rule, menstruation appears too frequently, every two or every three weeks, and lasts from the usual time to eight or ten days: occasional cases last for as long as two weeks. It is important in weighing this symptom to inquire carefully into the past menstrual history. Not uncommonly, women present themseves for treatment in whom a frequent and prolonged menstruation is natural, and this condition must not be confounded with a pathological one. Where the flow has formerly been fluid, under the altered condition it is apt to become clotted and dark. The function is accompanied by pain, which may appear some days before the flow and last several days after it has ceased. Like all the other symptoms, this one is variable, and in not a few cases the flow is scant rather than profuse. Scanty menstruation is the exception in inflammatory diseases of the Fallopian tubes, but that it does exist is undoubted. Suppuration of the exudates and an accumulation of pus in the tubes has no very perceptible influence upon these symptoms. Pain, hemorrhage, and leucorrheal discharges seem to depend largely upon the amount and character of the involvement of the serous membrane; certainly pain is almost absolutely dominated by this factor; possibly the altered mucous membranes have the most influence upon the other two symptoms. The three symptoms grouped together in conjunction, with a history of gonorrheal infection or of post-puerperal septicemia, are highly suggestive, and yet not much reliance can be placed on a diagnosis based upon this data. The three symptoms, alone or grouped together, accompany almost every disease to which the pelvic organs of the female are heir. These symptoms, however, taken in conjunction with certain local conditions, establish the diagnosis almost certainly.

As in all inflammations, the temperature and pulse are affected. Usually neither of them rises to any very great extent. During the first few days of the acute attack they may both be elevated considerably above 100°. As seen in the subacute or chronic condition, it is rather uncommon to note any great deviation from the normal where suppuration has not occurred or where the peritoneum is only slightly or not at all involved. If the attack has been ushered in with a chill or rigor, it is almost certain that either one of these two conditions exists. As a matter of fact, peritonitis and cellulitis almost always accompany and complicate the salpingitis, and consequently the symptoms of the two conditions always commingle.

The tendency of inflammation near or about the bowel is to inhibit peristaltic action, and constipation is the rule. As constipation is almost the natural condition of women, however, it adds little to our diagnostic resources. On the other hand, the bladder becomes irritable under the same condition, and the presence of the urine causes a frequent desire of the bladder to empty itself. Frequent micturition and constipation are common symptoms. Any irritation in the pelvis seems to give rise to gastric disturbances, and the inflammatory diseases are no exception. Symptoms of dyspepsia, espepecially flatulence, are very common, and, in fact, at times give rise to more distress than the symptoms referable more directly to the pelvic lesions. Distension of the intestines with gas occasions considerable pain at times—a pain which comes and goes, and which is distinctly different from the inflammatory pains.

Pyosalpinx and Ovarian Abscess.—Should the inflammation progress to suppuration, many of the symptoms are apt to become exaggerated, and in addition there is added the condition of sepsis. The woman begins to suffer from cold creeps, chills, or even a rigor; the temperature becomes elevated, ranging from 100° to 104°, or even higher; the pulse rises rapidly, and varies from 100 to 140 or more beats to the minute. The abdomen becomes swollen, due to distension by gas, the walls hard, unyielding, and exceedingly tender to the touch. The skin surface may become cold and clammy, the appetite destroyed, the sleep restless and unrefreshing. A general feeling and appearance of dulness, or even stupor, may supervene. The pain is more persistent and intensified, and is apt to assume a more or less deep, throbbing character. As time passes the woman's general condition gradually grows more and more serious. She loses many pounds of flesh and becomes greatly emaciated; her face has a distressed and shrunken appearance; her nervous system becomes shattered; she may or may not be confined to her bed. It might easily be concluded from these remarks that no great reliance could be placed upon symptomatology in the diagnosis of inflammatory tubal disease. Such is, in truth, the fact. It is absolutely necessary that the physical signs be determined by vaginal examination before the truth can be ascertained.

Peritonitis.—The symptoms attributable to this disease are a combination of those produced by the inflammation of all the other parts of the pelvis. As a matter of fact, the main symptoms attributable to pelvic inflammatory cases are produced by the inflammation of the serous membrane. Many of the symptoms described under different forms of salpingitis originate in or are increased by the peritonitis. Inasmuch as peritonitis to a greater or less extent complicates the inflammations of the Fallopian tube, the symptoms are practically the same, their severity depending much upon the extent of the lesion. If only the peritoneum covering the Fallopian tube be involved, then the symptoms will be similar to those already described. When the whole pelvic peritoneum is invaded, the pain is more acute; the temperature and pulse are more markedly elevated; the patient lies more comfortably with the knees drawn up, for the reason that it relaxes the abdominal muscle and takes away a considerable amount of the intra-abdominal pressure; the expression of the face is apt to be distressed; the abdominal muscles rigid and fixed; the whole abdomen tender to the touch; the intestines distended with gases, rendering the belly tympanitic; the appetite abolished and sleep impossible. Constipation is absolute and there are eructations from the stomach. Such is a fairly typical description of a severe attack of pelvic peritonitis. There are, in addition, all the symptoms present which have been enumerated as accompanying inflammation of the Fallopian tube, together with those present when the cellular tissue is involved; which is generally the case. Should suppuration of the exudates occur, there will be added the symptoms of septicemia. The difference of these symptoms from those arising in a suppurating salpingitis will be more of degree than of kind. In the abscess forming in the abdominal cavity, either as a small pocket in the midst of the lymph or as a general abscess of the whole pelvic cavity, the absorption is apt to be more rapid than if confined to the Fallopian tube.

Cellulitis.—The symptoms attributable to this disease are indistinguishable from those of peritonitis. The two affections go hand in hand, and any attempt to classify their symptoms would only be theoretical. As a matter of fact, they cannot be distinguished clinically. A simple infiltration of the cellular tissue with inflammatory products would produce no other symptom than possibly a feeling of weight and fulness, but this discomfort would be so overshadowed by the severe suffering from the peritonitis as hardly to be noticed. In those rare cases in which primary abscesses occur in the cellular tissue, following or accompanying the puerperium, nothing distinctive is noticed until suppuration occurs, and then the symptoms are simply those of septicemia. An attempt to classify and compare, for differential purposes, the symptoms of cellulitis and peritonitis is of no more than problematic value; it is of no practical benefit. Clinically, the two affections are indistinguishable, for the reason that they always complicate one another, and their symptoms are so closely interwoven. The symptoms of the cellulitis, which is mostly secondary, are few and unimportant and are completely overshadowed by the far more important and severe symptoms of the peritonitis, the primary disease.

Physical Signs.—In an attack of pelvic inflammation there is always a fairly regular routine followed, and the results are essentially the same, differing only in degree. Every case is in this respect a law unto itself, and in no two of them are the Fallopian tubes and ovaries equally degenerated and distended, nor are they always found in the same position. The physical signs are so closely interwoven that all the elements must be considered together if they are to be viewed to the best advantage.

Catarrhal Salpingitis.—Physical signs are entirely absent. There is no infiltration of the tube-walls, and no peritonitis or cellulitis, with attendant exudate of lymph and infiltration of inflammatory products. The Fallopian tube is almost, if not entirely, as soft as in its normal condition, and if there is any enlargement it is simply due to a mild congestion. For practical purposes it may be considered that in the average woman of ordinary size the Fallopian tube cannot be palpated. Such may be said also to be the case in catarrhal salpingitis.

Hydrosalpinx.—In this form of the disease the uterus may or may not be freely movable. Most frequently it is movable, as the Fallopian tube is either not adherent or so lightly so as not to affect the womb. The mobility of the uterus in health varies so much that it is often difficult to decide whether or not it is impaired. Most frequently, both Fallopian tubes are involved, although it is no unusual thing to find only one side affected. By deep palpation to the sides of the womb a cystic tumor, varying in size and shape, will be felt. The tumor is elongated, and can be traced with the finger from the side of the pelvis to the uterine cornua. It is distinctly felt to be free from the uterus and independent of that organ. Usually, a sulcus can be recognized between the two. The examination may simply disclose a large cystic tumor with nothing characteristic about it; in either case the growth may be fixed by adhesions and rendered immovable, or it may readily be displaced in any direction. The opposite side may be found in the same condition, or the examination may disclose nothing as regards its involvement. It is often found in a state of simple catarrhal salpingitis.

Very much the same can be said in regard to that phase of the disease in which the tube is distended with blood, as has been said of hydrosalpinx. Hematosalpinx has no distinguishing features. It differs from hydrosalpinx only in that it is apt to be smaller, with thicker walls, and more likely to be adherent, and consequently immovable. The affection is most usually unilateral, and is often complicated on the opposite side by an interstitial salpingitis.

When the walls of the Fallopian tube are infiltrated with inflammatory products and its peritoneal covering involved, an examination of the pelvis will reveal a condition depending upon the severity of the attack and the extent of its advance. The uterus will be found to a greater or less extent immovable, as well as enlarged. It will be adherent in a displaced position or not, depending upon its location in the pelvis at the time of the attack of inflammation. In the milder attacks the Fallopian tubes will be easily felt to the sides of the womb as hard, elongated cords, adherent, immovable, and extremely painful to the touch. The organ can readily be traced to the uterine cornua, and a sulcus may be felt between the two. The ovaries will be found about halfway between the pelvic wall and the uterus on either side, enlarged, hard, and adherent. The size of the tube and ovary, as well as that of the uterus, will depend upon the amount of involvement of the cellular tissue, but more particularly upon the extent of involvement of the peritoneum and the amount of lymph thrown out. A Fallopian tube and ovary which together appear in situ to be as large as a four-ounce bottle will not infrequently be found, on removal, not more than two or three times the natural size: the remainder of the bulk is found to have been made up of plastic lymph, which is to a great extent destroyed as the adhesions are broken up. The size of the womb is also at times more apparent than real, the enlargement being also due to the surrounding lymph. For the most part, however, the womb is actually enlarged by the inflammatory infiltrate into its walls, brought about by the primary endometritis. As often as not the uterine appendages are displaced, and may be found in any part of the pelvis. Both tubes and both ovaries have been observed on the same side, the one ovary being displaced in some manner, and found directly adherent on top of the opposite one. Not infrequently, when the uterus is retrodisplaced, either one or both appendages will be found posterior to this organ, and so high up as to be out of reach; they are consequently often overlooked. The disease is generally bilateral, and the same condition can be felt on both sides; at times, however, it is only unilateral. When there is acute involvement of the whole of the peritoneum on the floor of the pelvis, as well as of the connective tissue underlying it, a sensation of fulness in all directions will be felt, its hardness depending upon the amount of infiltration and the chronicity of the case.

Should the tubes and ovaries be distended with pus, they will be found on palpation in much the same condition as that just described. If the pus be present in considerable quantities, the masses may fluctuate or give to the touch a sensation of softness, and in very exceptional cases may feel not unlike ordinary cysts. Should small abscesses exist in the lymph or connective tissue surrounding the uterine appendages, they cannot be detected. When these intraperitoneal abscesses extend and involve a considerable part of the pelvis, advancing even into the connective tissue, the whole pelvic vault conveys a hard, board-like feeling to the examining finger—a condition which extends as far as the finger in the vagina can explore. It is not uncommon to find an infiltrating ring higher up about the rectum. This ring is due to connective-tissue infiltration, and does not usually break down into suppuration. Through the abdominal walls a hard mass of no definite shape or consistency can at times be felt, which is made up for the most part by adherent intestines and omentum. Ordinarily, the infiltrating masses cannot be felt through the abdominal walls except with the patient under the influence of ether: only in cases of pelvic abscess do these large irregular masses rise into the abdominal cavity high enough to be readily felt by abdominal palpation.

DIAGNOSIS.—The establishment of the diagnosis of pelvic inflammation is difficult or not according to the stage at which the disease has advanced and according to the virulence of the infection.

Catarrhal Salpingitis.—It is not possible to diagnose this form of disease except by inference. Symptoms are so slight as not particularly to call the patient's attention to her pelvic organs unless she be already suffering from endometrial disease; in this case the symptoms caused by the infection of the uterine cavity will so greatly overshadow all those of the salpingitis that she will have no cause to even suspect that her Fallopian tube is becoming involved. Even should the disease be suspected, there is no way in which the suspicion can be verified, for the reason that the Fallopian tube can only be palpated in exceptional cases, and even should it be felt, the changes in its tissue are so slight that they could not be distinguished by the touch. Later on, when sterility is demonstrated or a hydrosalpinx is discovered, the relation of cause and effect may be seen. The sterility may, however, be caused by intra-uterine disease, in which case, until the specimen be actually under the microscope, it is not always possible to make the diagnosis, even by inference. An element of doubt would exist under the most favorable circumstances, rendering speculation or theory absolutely useless for practical purposes.

Hydrosalpinx.—It is always possible to come to the conclusion in this phase of the disease that there is a tumor present in the pelvis which does not belong there. It may even be possible in some cases to say positively that this form of the disease exists. Theoretically nothing should be easier, but practically many elements combine to defeat the desired result. The tumor caused by a hydrosalpinx is mostly unilateral, and will be found in the position which should be occupied by the Fallopian tube and ovary. If a tumor be found in this position and its character be doubtful, an examination with the patient under ether will often clear up the doubtful points. The walls of this neoplasm are thin and the tumor fluctuates. The amount of fluctuation will depend largely upon the size of the growth, the consequent thinness of its walls, and upon the number and density of its adhesions. At times it is entirely free from adhesions, and is as freely movable, within the limits of the mobility of the Fallopian tube, as would be an ovarian cyst. Should the tumor be a large one, it will assume a rounded shape not unlike a cystic ovary. On the other hand, when the tubal distension is limited, the resulting tumor will retain the elongated, tortuous shape of the Fallopian tube. The principal diseases that may be mistaken for this condition are small ovarian cysts, small parovarian cysts, hematosalpinx, and extra-uterine pregnancy. In hydrosalpinx the main features in the diagnosis are the elongated, sausage-like shape of the tumor; the fact that it can be traced to the uterine cornua at the position where the tube would naturally be found; the presence of the ovary independent of the tumor; and the fact that it is a cystic growth. The ovarian cyst is always rounded in shape, and there is no connection whatever between it and the uterus. The parovarian cyst is apt to be much less movable, and never has the elongated shape of the hydrosalpinx; neither has it any connection with the uterus such as described.

It is not possible to distinguish hematosalpinx by the physical signs, and the symptomatology is too unreliable to be trusted. The fact that the blood-tumor is more liable to be adherent is not sufficiently practical to be of much benefit. Extra-uterine pregnancy can generally be distinguished by its symptomatology and by watching its behavior as it grows. It is probable that more frequent mistakes will be made in the case of small parovarian cysts than anything else. After all has been said, failure oftener than success results in an attempt to diagnose hydrosalpinx.

Hematosalpinx.—What has been said in the case of hydrosalpinx is equally true of this disease. The same characteristics of the tumor exist, excepting that the hematosalpinx is not apt to become so large. However, as there are many cases of small hydrosalpinx, this point has no particular value. The tumor is elongated; it is connected at the uterine cornua, as is the case with the normal Fallopian tube; it fluctuates more or less satisfactorily; if the distension be only slight, this sign is worthless. The question of adhesions is also of dubious advantage, as any of the products of pelvic inflammation are almost certain to be adherent. The one sign which may be of advantage in the diagnosis of either hematosalpinx or hydrosalpinx is the division of the elongated tumor into compartments, or an apparent attempt in this direction. The healthy Fallopian tube is so divided, and it is frequently the case that a tube distended by fluid contents has two or more compartments. These can at times be appreciated by the touch, and in case they are a diagnosis can probably be arrived at.

Interstitial Salpingitis and Ovaritis.—Nothing is more deceptive than the symptomatology in pelvic inflammations. A woman may present herself complaining of all the symptoms of diseased, disorganized appendages, and yet an examination fail to establish such a diagnosis. A patient may give a history of having been married for some years and of having had one or more children. She has remained in good health until in her last confinement or miscarriage, when she has had septic trouble, indicated by a swollen and painful abdomen, together with fever. Or her trouble may have begun with a well-marked attack of gonorrhea. From this time until she consults her physician she is not in good health. Pain is a constant companion, being referred to the iliac regions or the back. There is pain on coitus, defecation, riding in the cars, walking, or sitting down, and under any circumstances which will cause a displacement of the pelvic organs. The menstrual function, which was originally normal, is now profuse and irregular. Muco-purulent discharges exist; the patient suffers from chilly feelings at times, and loses flesh. The history in such a case is complete, and if the symptoms alone are depended upon to make the diagnosis, the most skilled physician will probably be often led astray. Such patients continually report themselves, and a bimanual examination even under ether fails to confirm a diagnosis of pyosalpinx or of chronic interstitial salpingitis, although the entire pelvis may be exquisitely tender to the touch. In such cases, where the abdomen has been opened for exploration, the peritoneum and cellular tissues have frequently been found to be healthy, as far as a macroscopical examination could determine. It is altogether unjustifiable to send a patient to the operating-room, presumably suffering from the results of pelvic inflammation, without first having made a thorough and searching examination of the pelvic organs by bimanual palpation; and if there is any doubt as to the existence of any lesion, the examination should be made with the patient under ether. The combination of the symptomatology and physical signs will generally succeed in establishing a correct diagnosis in these diseases. However, unless one of the Fallopian tubes or ovaries can be palpated, and plainly demonstrated as being enlarged and diseased, the diagnosis cannot be said to have been established. The symptoms can generally be traced to a labor, a miscarriage, or an attack of gonorrhea. A very large number of the patients have had an "inflammation in the stomach," or give a history of having had typhoid or malarial fever in or following the puerperium; their symptoms have dated from or about this time; sterility is a prominent and constant feature. The principal indication of the underlying trouble is the pain and the disordered menstrual function, and not infrequently there is a history of one or more attacks of peritonitis. A vaginal examination usually discloses an adherent and more or less immovable uterus. In a goodly number of cases, however, the uterus will not be found fixed, but movable within certain limits. An attempt to displace the womb will elicit pain, whether it be adherent or not, the pain being caused for the most part by the dragging upon adhesions, either those involving the uterus or those encircling the Fallopian tube and ovaries. The pain will be greater or less in proportion as the inflammation about the parts has subsided.

To the right or left on both sides of the womb the Fallopian tubes and ovaries may be felt. The tube is enlarged, thickened, and adherent. Attempts at displacing it result simply in causing pain; the whole pelvic vault is tender when the inflammation has not subsided. The Fallopian tubes will be felt as elongated, tortuous bodies in the position of the normal organs, extending from the side of the pelvis to the uterine cornua. In some cases the ovary, from the fact that it is prolapsed to a lower level than that of the tube, forms the greater bulk of the mass presenting to the examining finger; slightly deeper palpation will, however, usually disclose the elongated tube. Occasionally it happens that the uterus is retrodisplaced, and the appendages are one or both of them twisted posterior to the fundus, and, unless the patient be under the influence of ether, cannot be distinguished. So closely attached are the appendages at times to the womb that the whole mass appears as one body, and it is only by the irregularity of the mass and the existence of a sulcus between the diseased appendage and the womb that the true condition can be distinguished. An examination by the rectum which permits of the examining finger being passed posterior to and above the uterus and broad ligaments will often decide these points, where no definite conclusion could be arrived at by the combined vaginal and abdominal touch. In the acute condition, where the appendages are surrounded by and buried in masses of peritoneal lymph and the cellular tissue is involved, they will appear to be of great or indefinite size. The whole vaginal vault may be so hard and board-like that it will be impossible to distinguish the appendages through the general mass of lymph. In the more chronic form, when the lymph and cellular exudate have in great part been absorbed, the tube may present itself only as large in diameter as an ordinary lead pencil. It is not very probable that there will be a failure to diagnose the disease, excepting where it has undergone suppuration and assumes more or less the character of a cyst. These enlarged and thickened tubes and ovaries, densely adherent and often surrounded by masses of peritoneal lymph and cellular exudates, taken together with the history and symptoms, can hardly be misunderstood. There are few conditions for which this disease is likely to be mistaken.

Every woman suffering with the lesions of a pelvic inflammation is liable from time to time to have the inflammation recur. Frequently the inflammation never leaves the parts, but remains as a low-grade chronic disease, ready to relight into an acute exacerbation on the slightest pretext. In other women it subsides entirely and the parts become quite free from pain. In such a case there is less likelihood of recurring acute attacks, but yet they do occur. A woman carrying diseased tubes and ovaries due to pelvic inflammation may be confined to her bed as often as three or four times a year, for from two to eight weeks at each attack. Usually the recurrence is not so severe, and may not happen oftener than once every year or two; others only last a few weeks, frequently not even confining the woman to bed. Exposure to cold, excessive indulgence in coition, violence on the part of the husband, working tread-machines, hard work of a hundred and one different kinds, generally determines the exacerbation. During the menstrual period the women are peculiarly liable to these attacks. The physiological congestion of menstruation may very readily be turned into a pathological condition, and an inflammation result. Women afflicted with pelvic inflammations frequently suffer from attacks of apparent peritonitis which simulate to a great degree the true inflammation. The abdomen and pelvis at the time of the examination are found to be exquisitely tender, and not infrequently an investigation is rendered impossible. By persisting firmly but gently, at the same time calling the patient's attention to some other object, a pelvis and abdomen which would barely tolerate the approach of the hand may be brought to bear, without any complaint from the patient, a very free amount of manipulation. The hysterical element in these cases of long suffering is oftentimes great, and it must always be taken into consideration in estimating the amount of pain.

Pyosalpinx and Ovarian Abscess.—Should suppuration intervene, there is at once added the element of septicemia. The tube may contain but a few drops of pus, in which case the only additional aid to the diagnosis would be in the special symptoms produced by the absorption of the pus. Following confinement or miscarriage, a woman may have a slow and unsatisfactory " get up," or she may not get up at all. Her temperature remains in the neighborhood of 100° F., while her pulse-beats continue at about 100 or more. She has no appetite, suffers with pain in the lower part of the abdomen, sleeps restlessly, and has occasional creepy feelings. This condition keeps up for months, with a progressive loss of flesh—slight, it is true, but steady. An examination reveals a mild form of pelvic inflammation, with the usual lesion of the appendages. This condition, taken in connection with the history, fairly establishes the presumption that pus is present if all other possible sources of suppuration be excluded, although it is impossible to detect any signs of it by the vaginal examination. Should pus accumulate in any great quantity, the Fallopian tube soon distends, and may at times reach the size of a large sausage. Should the suppuration occur in the tube, in the lymph around the tube, or in the ovary, there would be little if any difference in the result. Wherever it is located, if the quantity be sufficiently large, the pelvic tumor fluctuates or the whole mass presents a semi-soft or boggy feeling. Not infrequently the fluid portion of the suppurating contents is absorbed altogether, leaving the tube filled with a cheesy material which may remain indefinitely and without causing any particular disturbance, other than by the mere presence of a foreign body in the pelvis. When such a case has been complicated by an inflammation of the peritoneum, the same condition may remain, and the patient suffer just as much as though the fluid had not been absorbed. Fallopian tubes of this character become at times the size of large sweet potatoes. It is exceedingly difficult frequently to distinguish pyosalpinx and ovarian abscess from some other pelvic diseases, notably extra-uterine pregnancy or abscess located in other parts of the pelvis. No two pelvic diseases are so frequently mistaken for one another as pyosalpinx and ectopic gestation. A careful study of the history of the patient is at times essential to a determination of the difference, and is of more value than the physical signs. Extra-uterine pregnancy produces symptoms which, if they can be elicited, are characteristic, but they are so frequently modified that it is difficult to distinguish them. The pain in the two diseases may be essentially alike, at least so far as a description of it can be elicited from the patient: the physical characteristics of the cysts are not dissimilar, both being semifluctuant, located in the same position, of the same shape, and of about the same size in the early stages of the pregnancy. The uterus is enlarged in both, the menstrual function is disordered, and the breast and stomach symptoms are not infrequently similar in either case. The casting off of the decidual membrane is by no means a constantly demonstrable feature of the extra-uterine pregnancy. The progressive growth of the tumor, if the patient be kept under observation sufficiently long, is very suggestive, if not positive evidence, of ectopic gestation.

Suppuration confined to the Fallopian tubes or ovary is more apt to give a circumscribed tumor than suppuration in the plastic lymph or connective tissue. In the case of a pyosalpinx or ovarian tumor the tube-sac can be felt as a distinct body, adherent and immovable, it is true, but still a circumscribed tumor, with a distinct sulcus between it and the uterus. The true pelvic abscess is quite the reverse, and oftentimes nothing definite can be made out, only a general fulness occupying the pelvis more or less, without any definite limitations, and so involving all the pelvic organs that none of them can be distinguished. In either case there may or may not be fluctuation.

Cystic tumors are distinguished from a pyosalpinx or ovarian abscess by the thickness of the walls of the latter, the more boggy feel, the septic symptoms, and the history. A tubal and ovarian mass confined to the pelvis, fluctuating, with thick walls, densely adherent, painful on examination, with a history of sepsis, can hardly be mistaken for anything but a tubal or ovarian abscess unless it be an extra-uterine pregnancy.

Peritonitis.—Pelvic peritonitis in women rarely if ever exists without a pre-existing endometritis and salpingitis; among the exceptions it has been noted that an appendicitis has occasionally been the source of the disease. These cases are rare, and although the vermiform appendix has not infrequently been found in the pelvis perforated and adherent to the Fallopian tube and ovary, with abscesses in the surrounding lymph, yet it is always a question as to whether the inflammation started in the Fallopian tube or in the vermiform appendix. The diagnosis would rest in such a case almost entirely upon the history. Wherever the disease originates, the result has been observed to be the same —a salpingitis and a peritonitis. When the symptoms and diagnosis of salpingitis have been considered, about all that can be said about peritonitis has been told, for the reason that inflammation of the Fallopian tube and the symptoms arising from the combined disease originate mostly in the peritonitis. A salpingitis uncomplicated by an inflammation of the peritoneum would give rise to but few symptoms. Such is the case with catarrhal salpingitis, and even with its resultant lesion, hydrosalpinx. It is the peritonitis accompanying the salpingitis that causes the formation of the large masses of lymph, the subsequent adhesions and immobility of the organs, the pain, the leucorrheal discharges (in part), the disordered menstrual function, and, in fact, all the prominent symptoms of the disorder. The extent to which peritonitis exists in any given case is oftentimes problematic and can only be guessed at. The whole pelvis may be involved or the lesion may be limited to a fractional part of it. The less of the serous membrane involved, the less will be the pain and the fewer the adhesions. In the acute stage of the inflammation lymph is thrown out about the parts affected, and the contiguous serous surfaces become attached to one another. These points can be palpated and a fairly clear idea of their extent obtained. The exudated lymph may be confined about the Fallopian tubes or ovaries, one or both, or it may be found that the loops of intestine and omentum overlying the pelvic inlet have become involved, and are adherent to each other and to the pelvic organs. This lymph exudation and adhesion is Nature's method of heading off an inflammation of the serous membrane, and it is interesting to note the repeated and continued exudation, as the inflammatory process overcomes the areas it has first attempted to protect, knuckle after knuckle of the intestine becoming glued together in front of the advancing infection, until the lymph has finally effectually stayed its progress. The result in bad cases is an indurated mass in the lower portion of the abdomen, overlying and dipping down into the pelvic inlet. With the patient's history and the presence of such a tumor it is not hard to realize the relation of cause and effect. Such a mass is usually more or less tympanitic and immovable. Under treatment, unless suppuration has occurred, these masses disappear to a great extent, leaving the intestine and omentum adherent, it is true, but as the lymph has been absorbed the mass has lost its hard, indurated character, and has assumed more nearly the usual characteristics of the soft intestine. In fact, as a distinct tumor the whole mass generally disappears; in some cases, on the other hand, it remains to the end. Should suppuration occur, this is the usual course. Suppuration of the tubal contents is very common, and is not infrequently associated with a breaking down of the peritoneal lymph surrounding the appendages at several points, resulting in the formation of one or more small abscesses about the appendages. These surrounding abscesses are commonly spoken of as occurring in the connective tissue, but they arise distinctly from and in the plastic lymph. It is not possible to diagnose their existence prior to an operation unless they spread and become large enough to overshadow the tubal or ovarian abscess. Even then it is more than probable that they would be mistaken for an abscess located in the Fallopian tube or ovary. As a matter of fact, they do not often become so very large, unless the infection has travelled fast and overcome the resistance of the obstructing lymph, forming a large pelvic abscess—intraperitoneal as a matter of fact, as are almost all the pelvic abscesses.

It is possible at times to say that the pelvic abscess exists, but usually the distinction can only be made between a true pelvic abscess and a bad case of pyosalpinx by an experienced diagnostician, the points of difference being determined by the physician's personal experience and delicacy of tactile sense. As a rule, where there is a large indurated mass rising into the abdominal cavity free pus will be found in the pelvis; but this is by no means a sure sign. When the pelvis is full of free pus, the vaginal vault is apt to give a sense of fulness and induration in all directions, as if the whole pelvis were filled with a solid mass. This feeling extending more or less over the whole of the pelvic floor, none of the pelvic organs can be outlined; the uterus is fixed in its position, whatever that may be. Fluctuation may or may not be detected; frequently the pelvic floor is so hard and indurated that this sign is very uncertain. That a bad pelvic inflammation has existed, and that suppuration has occurred, are usually unmistakable. Anything further in the line of an exact diagnosis must rest on the particular features of the special case and the physician's dexterity and experience.

Cellulitis.—What has been said about peritonitis is also true of cellulitis. A few cases of this disease may arise in puerperal patients by transmission of the inflammation along the walls of the lymphatics and suppuration of the cellular tissue. Such cases are rare, and if they do exist cannot be diagnosed from the intraperitoneal pelvic abscesses, those which arise within the peritoneal sac from breaking down and suppuration of the peritoneal lymph and exudates. Inflammation of the cellular tissue always accompanies a severe peritonitis, and the two are indistinguishable from a diagnostic point of view. The cellular tissue in the broad ligaments becomes involved in the course of a pelvic inflammation, the result being a distension of the ligament by exudates and a destruction of the cellular elements by the inflammatory process. As the inflammation subsides, the ligament is contracted or destroyed, which result may be recognized at a subsequent investigation after the case becomes a chronic one.

The usual points of distinction between a pelvic cellulitis and a pelvic peritonitis, as formulated and compared in all works on gynecology, are misleading and worthless. It is utterly impossible for any one to make a practical distinction between these two phases of a common disease, and the formulæ as given only tend to complicate the understanding of what is possible and what is clinically true. The difference is purely theoretical; practically and clinically they are part and parcel of the same disease—viz. pelvic inflammation. The cellular tissue rarely suppurates except in conjunction with the suppuration of the peritoneal exudates. When it does break down, it cannot be distinguished, short of operation, from other forms of pelvic abscess. The disease, except in the form of an abscess, never exists as a chronic condition; its resultant contraction of the broad ligament may exist and be recognized, but the cellular inflammation has ended in the acute attack by a destruction of the connective tissue.

Prognosis.—The prognosis of pelvic inflammations is variable according to the phase which the disease assumes, the character of the infection, and the manner in which it is treated. It may end in complete recovery, permanent crippling, or death. Catarrhal salpingitis usually undergoes a spontaneous cure, at times with a complete restoration of the tissues to their normal condition of health, oftener after the destruction and desquamation of the ciliated epithelium. Should the Fallopian tubes become occluded at any point, sterility is an accomplished fact, and either a hydro- or hematosalpinx a possibility. Even without occlusion of the Fallopian tube sterility is frequent, from the fact that the cilia, whose function it is to carry the ovum toward the uterine cavity, are lost, and the ovum may lodge at any point throughout the length of the tube, and there perish, or it may be so long delayed in its passage as to be too enfeebled to become impregnated when it meets the spermatozoid. Extra-uterine pregnancy is commonly accompanied by a history of long-standing sterility, and it is this disease which is supposed to be the cause of the misplaced conception. The ovum, lodging in the Fallopian tube, becomes impregnated by the spermatozoid, and, not being able to escape into the uterine cavity, develops in the tube.

If the ends of the tube remain patulous, there is no great danger of an accumulation of the excretions, but should they become closed, a hydrosalpinx is almost inevitable, unless the excretions have ceased or the absorptive powers of the tube are equal to the occasion. Hydrosalpinx is not fraught with any great danger to life, and unless it becomes complicated by pelvic peritonitis is not liable to cause any great discomfort to the patient. It would act in much the same manner as would small unadherent ovaries. Should peritonitis supervene and adhesions result, the patient would suffer from long-continued pelvic distress and pains, and would be liable to secondary attacks of peritonitis. Hematosalpinx acts in much the same manner, it being more liable to inflammatory complications. Interstitial salpingitis always threatens life, for the reason that it is always complicated by pelvic peritonitis. The affected Fallopian tube is always occluded, either throughout its course or at its distal end, by the fimbria becoming adherent to the ovary. If both tubes are so affected, sterility is certain and permanent. The amount of danger to life will depend in great part upon the amount of the complicating peritonitis and cellulitis. If the infection has been a particularly virulent one, and has escaped out of the fimbriated end of the Fallopian tube before Nature has had an opportunity to build up a wall of obstructing lymph, it will probably infect the larger part of the pelvic cavity before its course can be stayed: should it escape into the abdominal cavity, a general peritonitis is likely to result, and death follow. Puerperal septic infection is more liable to have this termination than gonorrheal infection, although the latter claims its fair share of victims. Women who have acquired interstitial salpingitis, and in whom the disease has become chronic, are very liable to suffer from recurrent attacks of peritonitis. These attacks occur more or less frequently and with more or less severity. At any time they may develop into a general peritonitis and end fatally, or suppurative changes may be set up which will require a surgical operation to save the patient's life. As long as they remain quiescent they cause little more damage than that brought about by the constant pain. On the other hand, they may render the patient's life miserable, the only prospect of relief being either their removal or the menopause. It is an undoubted fact that the change of life, when it becomes established, brings relief and cure to many of these women: the disease, however, frequently accompanies delayed menopause, and is most probably the cause of the delay. Spontaneous cures other than by the menopause are rare; at the same time, it cannot be successfully disputed that such is the case in a small proportion of cases.

Pyosalpinx and ovarian abscess are much more liable to be accompanied with recurrent attacks of peritonitis, and are consequently more serious lesions, than any of the other forms of disease of the uterine appendages. Usually they mean lifelong invalidism to the patient if she escapes primary death. Death is often the least of the consequences of this lesion. The patient drags along in a miserable condition of sepsis, with its resulting fever, hectic, and emaciation, until she dies of exhaustion or until the abscess has succeeded in finding an outlet into some of the neighboring viscera: even then her last state is hardly better than her first. Should the rupture occur into the uterus, a spontaneous cure may result, or the tube may refill and discharge repeatedly, all the while with the chance of its calibre becoming permanently closed. Should leakage take place from the fimbriated end into the peritoneal cavity, a general suppurative peritonitis may result, with its usual ending. Should, on the other hand, the pus find its way through the bowel or bladder-walls, a sinus will be formed which will most probably refuse to yield to any treatment short of surgical. This disease, at the best, means a lifelong invalidism to the patient, and is a constant menace to her life. Much the same may be said of abscesses in the pelvis due to peritonitis and cellulitis. Those occurring primarily in the cellular tissue, following labor, are said to run a rapid course, and generally end in death, unless they are recognized and provision made for the discharge of the pus. Even with this precaution many cases die. The same may be said to be true in a lessened degree of ordinary pelvic abscesses, although this form is apt to give sufficient time in which the physician may act. If these abscesses are properly opened and drained, the chances for the patient's recovery are good. Should they be neglected, the woman will either die from the exhaustion of septicemia, or the abscesses will open spontaneously in one of the many ways already described. Frequently it is impossible to obtain healing of the sinus tracks made by the burrowing of the pus from these abscesses, and, in spite of the fact that the abscess-cavity is emptied, the purulent discharge continues indefinitely, the patient eking out a miserable, lingering existence, only to die finally of exhaustion.

Treatment.—The treatment of pelvic inflammation is satisfactory in accordance with the stage of the disease and the manner in which it is attacked. It is one of the preventable diseases, and if the infection is taken in hand in time it is perfectly amenable to treatment. After it has gained full headway it is only possible to ameliorate the symptoms, and finally, if necessary, to remove the resulting lesions. The treatment is prophylactic, palliative, and curative.

The prevention is embraced in the treatment and cure of the infection while it is still confined to the vagina and to the uterus. If the vaginitis or endometritis be taken in time, the disease may readily be stayed and a pelvic involvement prevented. This is true of the majority of cases, but it must be borne in mind that there is a certain proportion, of puerperal patients particularly, in whom the infection travels so rapidly that the serous membrane is involved before the physician has time to realize that the danger is seriously threatened; this is also true of a small proportion of gonorrheal cases. In spite of the existence of these exceptional cases, it is a lamentable fact that the majority of pelvic inflammations are preventable, and that the attending physician is only too frequently responsible—if not for sins of commission, at least for sins of omission. Should a patient be suffering from gonorrhea, it should always be attacked vigorously and scientifically, ever bearing in mind that the mildest case may result in irreparable damage to the pelvic peritoneum, and may even result in death. The vagina must be exposed throughout its whole extent and thoroughly treated, and, if the endometrium becomes involved, it should receive equally prompt attention. The methods of treatment of these troubles will be found fully expounded elsewhere. Infection starting in the uterus from a post-puerperal sepsis should never be neglected. General treatment as it is too often indulged in by the physician is only playing with fire, and, like the proverbial child, his fingers are frequently burned. Every woman who after a labor or a miscarriage has an elevation of temperature and pulse should at once have an antiseptic vaginal douche. Should the temperature and pulse not fall to normal or thereabouts after several such douches repeated at half a dozen hours' interval, the syringe should be carried to the fundus of the uterus and a similar injection made into the cavity of the womb. If after repeating this treatment several times in the twenty-four hours the patient's symptoms have not subsided or become markedly better, the physician is committing an inexcusable blunder if he does not thoroughly curette the whole of the cavity of the womb, irrigate it, and render it as aseptic as possible. Should all cases of gonorrhea and puerperal sepsis be treated on these common-sense principles, pelvic inflammations in women would be far rarer than they are at the present time. To just the extent of propriety and intelligence with which the physician treats these cases will he have the fewer cases of pelvic trouble originating in his practice.

Should the disease once invade the Fallopian tubes, it is beyond local treatment, and it is largely a matter of chance as to how far it will spread and how much damage it will succeed in doing before being brought under control. In Nature's hands lie the most effective weapons for combating the inflammation, and practically all the physician is able to do is to aid by placing the patient under the most favorable circumstances possible, and giving Nature every chance to succeed in her fight. In the acute form of the disease two objects must be kept constantly in mind: the force of the inflammation must be weakened in every possible way, and Nature must be left unhampered to wage the fight. As in every inflammation, rest is absolutely essential. By "rest" is meant sexual as well as physical quietude. The woman should be placed in bed, and kept there until the attack has subsided: sexual intercourse should not only be absolutely prohibited, but even the approach of the husband, sufficient to excite pelvic congestion, must be carefully guarded against. Many an attack of threatened pelvic inflammation has been precipitated by indiscretions in these directions. During the menstrual periods the greatest caution is necessary. The congestion incident to this period is physiological, but in a patient who is threatened with a pelvic inflammation, or in one in whom the inflammation is actually in existence, it may readily be converted into a pathological state and the inflammatory attack be precipitated. Rest cannot be perfectly obtained if the bowels, especially the sigmoid flexure and rectum, are allowed to become overloaded with fecal matter. The hard, scybalous masses which form under these circumstances are a continual source of irritation. Woman is naturally a constipated animal, but these masses are the more apt to form, inasmuch as the peristaltic action of the bowel is in great part inhibited by the inflammation of its serous coat. It becomes a matter of prime importance, then, to empty and keep the lower bowel free from accumulations of fecal matter. Absolute rest having been secured, depletion is next to be obtained. The intestinal tract is the most adapted of all sources for bringing about this result. The free use of some drastic purgative will best conserve the purpose. Possibly some one of the magnesium salts is the best drug for this use. Magnesium sulphate, administered in doses of a teaspoonful, dissolved in a small quantity of water, a saturated solution being preferable, each hour, for from six to ten doses, will usually produce the desired result. Should the salts be rejected, as they sometimes are, any other purgative may be substituted. The bowel will incidentally be emptied of its fecal contents, and large and repeated watery stools will result. The amount of damage done by friction set up by the peristaltic action of the intestines will be far outweighed by the good done by the general and local depletion. The watery stools are produced by drawing on the fluid element in the blood-vessels from all over the body, but particularly from those near and connected with the intestinal tract. The withdrawal of this fluid lessens the blood-supply to the inflamed parts, and at the same time creates such an intense demand for fluid in the vascular system that the inflammatory exudates are taken up the quicker. A pelvic inflammation which is just starting is often cut short by this procedure, and it is at times surprising to see the amount of relief experienced by patients, as demonstrated by the cessation of pain and the absence of the anxious expression of the countenance. One free movement of the bowels will in some cases act more promptly in this direction than will several hypodermics of morphia. There are certain cases, however—usually those who have been suffering for some time before having come under treatment—whom the treatment will not relieve, it matters not how many times the bowels are moved. Inflammations in the pelvis are like inflammations in any other part of the body: if depletion is not applied until the trouble is chronic, there is little to be expected from it; in the acute stage it is invaluable.

It is not possible to keep up purgation indefinitely, and especially if the patient be not particularly strong, care and discretion must be used in this direction. It is well, if the woman can stand it—and the vast majority of them are able to do so—to procure one good purgation consisting of six to ten free watery stools. After this the bowels may be kept soluble daily by administering a laxative once in the twenty-four hours. After purgation hot vaginal douching is perhaps the best method of securing continued depletion of the pelvis. If the douches be given properly, they will go a long way toward effecting a speedy reduction of the inflammation; if they are given improperly, they will only render matters more complicated. Douches as usually employed by the profession at large were far better done away with altogether, as they only tend to render the pelvic inflammation worse. The primary effect of the application of hot water is to cause a congestion and the determination of large quantities of blood to the parts, as any one can demonstrate for himself by placing his hands in hot water and noting how puffy they become. If the water be sufficiently hot and the hand be held in it long enough, the tissues will begin to shrink, and what is commonly known as the "washerwoman's hands" will be the result. This condition is brought about by the secondary action of the hot water; that is, contraction of the soft tissues. This contraction renders the calibre of the blood-vessels smaller, and drives a very considerable proportion of the blood out of the parts so affected. The more profoundly this action is produced and the longer it is kept up, the more complete and lasting will be the depletion. It is this secondary effect of the hot water that it is desirable to produce in the pelvis. The more thoroughly the blood is driven away from the parts, the sooner will the inflammation subside; the more frequently the action is brought about, the sooner will the blood-vessels acquire sufficient tone to limit the amount of blood they will hold and its powers of exudation. For the successful accomplishment of this object there are a few rules which it is imperative to keep in mind and carry out: The water must be hot, from 100° to 110° F., and to be sure that it is of this temperature a thermometer should be used. The water must be of sufficient quantity to produce the desired secondary action; for this purpose at least a gallon should be used at each injection. It must be applied directly and continuously to the parts to be affected; for this purpose the patient should lie in the recumbent dorsal position while the douche is being administered. It is important that this rule be observed, for the reason that should the woman assume a crouching or sitting position all of the water runs away as quickly as it is injected, barely coming in contact with the vaginal vault, the very part which it is desirable to reach. With the woman lying flat upon her back and the knees drawn up, the posterior portion of the vagina will be distended with water, and there will always be a residual amount *in situ*, which is constantly bathing the parts and is kept at the proper temperature by the continued injection. The douche should occupy from fifteen to twenty minutes in its application, and can best be taken in the bath-tub, if the patient is able to be up and about, and is forced to use it without the aid of a second person. The syringe, of whatever kind, used must have a hard-rubber nozzle, as metal, being a good conductor of heat, will burn the parts if the water is used as hot as is needed. These douches may be administered two or three times a day, and may be continued for an unlimited time, depending on their effect and the way in which the patient progresses; but in beginning them, it must be remembered that they are apt to cause a patient to feel exhausted; in fact, a patient is occasionally found not to be able to use them at all on this account.

Depletion may be obtained with advantage in certain cases by direct bloodletting. A free scarification of the cervix will not infrequently, early in the acute cases, give an immense amount of relief, and may even materially limit the extent and severity of the attack. This aid in the treatment is much neglected at the present day, but it will at suitable periods in an attack of pelvic inflammation be found of great service. If the treatment is attempted, it should be done in a thorough manner. The cervix uteri is to be well exposed by the aid of a speculum, and deeply punctured at a number of points, so as to cause free bleeding. Ten or fifteen punctures are none too many, and from three to six ounces of blood will not be too much to withdraw; it will, in fact, be difficult to obtain so much. It may be desirable to have the depletion continue for some little time, and if a light glycerin tampon will not aid the actual flow of blood, it will withdraw a portion of the watery element from the surrounding tissues, and thus in a mild way add its aid toward a continued depletion. It is not advisable or necessary to use all these methods of depletion in every case of pelvic peritonitis: they are the best methods at our command, and must be used with judgment as the indications for them arise in particular cases. In the acute form of the disease, when there is considerable induration, it has been proposed that an aspirating needle be thrust into the mass through the vaginal vault and the serous exudates drawn away. It is claimed that the depletion thus obtained will end the attack in a very short time. The amount of good derived by this measure will not be commensurate with the risks of carrying infection on the needle, and thus causing suppuration.

Should the pain become so great as to be unbearable before the inflammation has subsided sufficiently to give relief, it is eminently proper to administer an opiate for its temporary action. It is well to remember that opium in any form depresses the heart, lessens the excretive and absorptive powers of the tissues, and inhibits peristaltic action of the bowels, all of which effects are contraindicated in these diseases. It is exceedingly desirable that excretion and absorption should be free and that the bowels should remain soluble. For these reasons, if it becomes necessary to use an opiate —and it should only be used if absolutely necessary—that form is to be selected which will cause the least harm, and it is to be administered in as small quantities at as long intervals as is compatible with obtaining the effect desired. Morphia, used hypodermically, is least objectionable of all the forms of opium. Frequently one dose of an eighth of a grain is sufficient, but it may be necessary to repeat it at intervals of five or six hours for several doses. One injection of morphia in this dose will often relieve the patient of her intense pain until a movement of the bowels can be secured, when, as a rule, there will be no necessity for its repetition. The one dose can do no possible harm; it does not even delay securing the desired movement of the bowels.

Counter-irritants are not of any great importance in the acute form of the disease, but when it has assumed more of a subacute or chronic condition, they have their uses. Iodine applied freely to the vaginal vault and over the lower part of the abdomen once a day will give a certain amount of relief; whether it be actual or imaginary matters little; it can do no possible harm, and at least gives the comfort of the knowledge that something is being done. While not a great deal of reliance can be placed upon it, yet it is occasionally a matter of difficulty to explain the apparent cause and effect between the application of the treatment and the resulting relief. It is so uniformly used in conjunction with other treatment that it is sometimes hard to say whether or not it accomplishes good. Turpentine stupes and poultices to the abdomen do no harm and little good; what good they do accomplish is incidentally through the heat which accompanies their application, and is more mental than real: the good derived from blisters is hardly sufficient to counterbalance the amount of suffering they cause. These are all remedies which are very generally used, and serve as well as anything else to keep the patient satisfied that every possible thing is being done for her.

Little or no attention need be paid to the pulse and temperature, other than to watch them closely in order to note the progress of the disease. They are symptoms which will take care of themselves, and never call for any especial treatment: they will fluctuate with the inflammation, but seldom rise sufficiently high, or remain high long enough, to cause any organic changes in the tissues, unless pus be present. Under any circumstances the disease is to be treated, and not its symptoms. Antipyretics are never indicated, and only when sepsis arises are heart-stimulants called for. Diuretics and diaphoretics would have their places for purposes of depletion were there not much more prompt and efficient means at our disposal. Diet and drink are both important elements in the treatment. The diet should be light, but nourishing—of such a character as to make as little fecal matter as possible, at the same time not to furnish an excess of fluid. It is well for the first few days of the attack that fluid should be withheld as much as possible, so that the inflammatory excretions may be the more quickly absorbed.

The patient should be kept confined to bed until all pain and local tenderness have disappeared. If this line of treatment be carried out systematically and carefully, there is a chance in a certain proportion of cases that a permanent cure may result and the parts be restored to a fair condition of functional health. Frequently, in spite of the most careful treatment, the result will only be a relative one, and although the inflammation may subside after weeks' or even several months' treatment, yet masses of the exuded lymph, together with the disorganized Fallopian tube, remain, and the inflammation may be relighted at any time, when the whole treatment will have to be gone through with again. In certain cases the inflammation never entirely subsides, but the woman is a constant sufferer from pelvic pain and discharges. She eats little, sleeps badly, and coitus is more or less painful, as is also walking or jolting of any kind. Such patients will apply for relief after years of constant suffering. An examination will disclose a condition of insterstitial salpingitis, masses of unabsorbed exudates, and a tender pelvis. The woman is able to be on her feet attending to her daily work, but is often a wreck of her former self. It is possible in many of these women to greatly improve their condition, provided pus is not present in the pelvis. Their relief will naturally be only tentative, for as long as the exudates and diseased appendages remain, they are liable under favorable circumstances to a return of all their aches and pains. The object to be aimed at in the treatment of these cases will be to bring about an absorption of the inflammatory exudates and to accomplish a subsidence of the inflammation. In these women rest, especially sexual rest, is essential to success. The only sure way of accomplishing this is by separating husband and wife, so that there may be no temptation : for this reason, where it is possible, a hospital is the best place to carry out the treatment. When this is not possible, tamponing is quite effectual—in fact, is the only safeguard. The patient must be guarded as much as possible from over-exercise, especially the use of sewing- and similar machines. The clothing must be warm and dry, and all unnecessary exposures to cold carefully avoided. The bowels should be kept soluble, and an occasional purgation for its depleting effect is indicated. Depletion may also be obtained by the use of the hot-water injections, as in the acute form of inflammation, but to result in any good it will be necessary to use them systematically and for a long period of time: they should be used once or twice daily for months. Glycerin tampons, alternating with counter-irritation over the whole vaginal vault by painting with iodine, are of service if properly used. In fact, the tampon can be utilized, after the parts have been painted with iodine, with advantage. Dry tampons are frequently serviceable, even aside from their use in preventing coitus. The weight of a heavy and engorged uterus, retro-displaced, dragging upon tender and adherent ovaries, together with any movement of the pelvic organs caused by walking or riding, is a constant source of distress, pain, and backache. If the patient be placed in the knee-chest, or even the lateral position, and the whole pelvic mass of diseased and adherent organs be allowed to gravitate toward the abdominal cavity, a tampon of some soft yielding material can be placed so as to fill the whole of the vagina, or even the posterior portion of it, care being taken not to pack it hard enough to cause trouble by its pressure. When the patient stands on her feet the pelvic organs gravitate back again toward their former position, but the tampon now receives their weight and holds them somewhat above their former level, if only for a fraction of an inch—sufficient at least to take the drag off the adhesions. In a certain class of cases the relief obtained from this procedure is remarkable. It is essential that the tampon be of some soft, elastic, unabsorbable material, and that it be placed so as not to make too much pressure. Surgical cotton absorbs moisture, loses its elasticity in a few hours, and becomes a hard foreign body in the vagina. In addition, it shrinks, so that it loses its effect as far as giving support is concerned. Wool is the best material for this use. The tampon is much superior to a pessary for accomplishing this end. But the fact that a pessary at times gives relief to the patient suffering from pelvic inflammatory disease is only explainable in this way. In spite of the fact that a Smith-Hodge pessary will give relief in some few cases, it is a dangerous instrument to use in this disease. If an ovary is prolapsed, the pressure of the hard pessary will render its use unbearable from the pain it causes. Should a fall or jar occur while the pessary is *in situ*, it might readily transmit so much of a blow as to light up a latent inflammation or to rupture a cystic tube or ovary. A tampon is preferable in every way, and it may be put down as a good and safe rule that a pessary should never be employed in the presence of pelvic inflammation. Tampons, when used, should be removed at least every other day, and the vagina thoroughly cleansed and dried before a second one is introduced. If the tampon be thoroughly impregnated with some dry powder, such as boracic acid, it will keep sweet and clean the longer.

Where the application of iodine and glycerin has failed to relieve the pelvic pains and tenderness, ichthyol has proven itself a good substitute. Ichthyol, either in its pure state or mixed with glycerin in equal parts, and applied on a tampon to the vaginal vault, has succeeded in relieving the tenderness when everything else has failed. These applications in order to accomplish any good must be made at least twice a week for the course of several months or more.

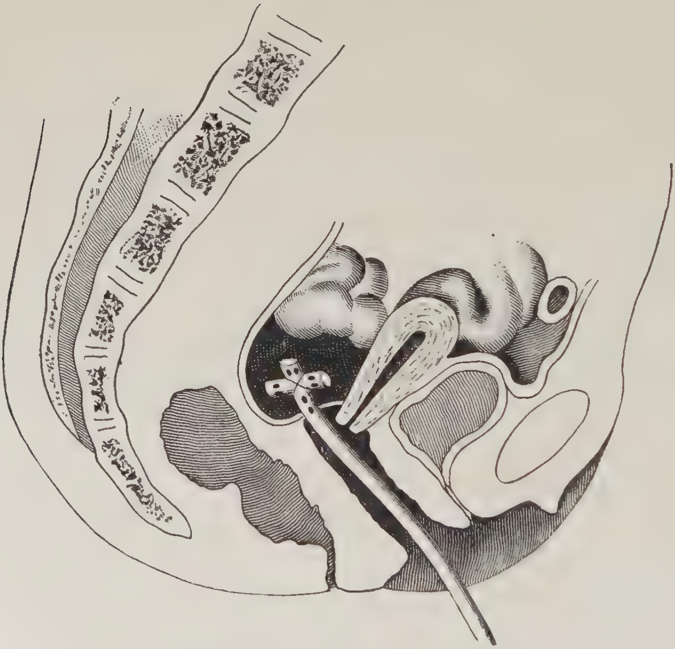
General medication accomplishes nothing directly; although potash, mercury, and other remedies have been lauded for their specific effect, there is no drug which, given internally, will have the slightest effect upon the inflammation or its products. The absorption of the infiltrates and exudates will be greatly aided as the condition of health of the patient is good or bad, and every effort should be made to build up the general health to as nearly a normal condition as possible. General tonics and alteratives, combined with a proper regulation of the bodily functions, a well-ordered diet, limited but healthful exercise, and slight stimulation when indicated, is the proper course of general treatment to follow. It aids in the cure simply by placing the tissues of the body in a favorable condition for performing their work, and by giving Nature a chance to rid the parts of the inflammation and its products.

Many of these patients are very much run down and have lost a considerable amount of flesh: they consequently need building up. Amongst other remedies for this purpose, electricity and massage have their place. General galvanism given daily for its tonic and stimulating effect, together with general massage, is indicated. It is not necessary to submit the patient, as a general thing, to a strict course of "rest treatment," as the good effects of this method may be obtained by a very material modification, and the woman may be up and about, attending to a moderate amount of work, sufficient to keep her body and mind occupied, without allowing herself to become over-fatigued. Electricity applied locally to the pelvis is of very indefinite value. In the acute attack of inflammation it has no place, and its use can only result in harm. When the force of the inflammation has subsided and it has settled itself down into a subacute or chronic condition, electricity may at times be used with advantage. It will occasionally relieve the symptoms of pain and uterine hemorrhage when other remedies have failed, and, on the other hand, it will often fail to give relief to these symptoms; in fact, it will render them worse, when other remedies will bring about the desired effect. The relief obtained from this remedy is, like all others, merely temporary: it never cures the lesion: it simply relieves the symptoms, and, the disease being still present, the symptoms are liable at any time, under favorable circumstances, to return. It is claimed for electricity by its votaries that large pelvic inflammatory masses will shrink and disappear under its use. Such is truly the case, but when we consider of what these masses are composed, it is easy to see why the remedy has been of service in causing them to disappear. They would have disappeared under any other proper method of treatment as well. In an acute attack of peritonitis great quantities of lymph are thrown about the diseased tubes and ovaries, forming large masses, which on palpation through the vaginal vault give an idea of size to the tube and ovary which is out of all proportion to their real size, the bulk of the tumor being made up of lymph-exudate. As the inflammation subsides, Nature causes an absorption of the lymph-exudate to a great extent, with the result that the pelvic mass gradually diminishes, until nothing but the adherent tube and ovary remain; the appendage at times is quite small. In fact, the case under these circumstances has now assumed the chronic form of adherent interstitial salpingitis. It is this natural function of absorption which electricity stimulates and aids—nothing more, nothing less. In addition, the soothing effect of the galvanic current gives in a certain proportion of cases great relief to the pain, while the uterine contraction induced by the stimulation of the uterine muscle, together with the direct effect of the cauterization upon the endometrium if sufficient current be applied, gradually lessens the amount of blood lost. As an aid in the treatment of cases of subacute or chronic pelvic inflammation the procedure is valuable: it is to be regarded as an additional remedy, only one of many, to be used as simpler and easier forms of treatment fail or are slow of accomplishing their object. In using this remedy the galvanic negative current should be selected, and the application may be made either intra-uterine or intra-vaginal, the latter being the safer. Where it is desirable to aid Nature in absorbing exudates and relieving pain, the current should not be stronger than the patient is able to bear without much pain; the application is to last but a short time, and is to be repeated two or three times a week. A good average application of the galvano-negative current, and one which is usually well borne, is in the neighborhood of fifty milliampères applied for about three minutes. When the hemorrhage is excessive, it is better to use the positive pole, and the application should be made intra-uterine. Weaker currents, twenty to thirty milliampères, are to be used where the galvano-positive current is selected, for the reason that this is much more painful than the galvano-negative and is not so readily borne by the patient. Even though the current is not sufficiently strong to cauterize the lining mucous membrane of the uterus, yet the positive pole coagulates the albuminoids of the tissues and causes contraction of the uterine muscles, in this way lessening uterine hemorrhage, and cutting off the blood-supply. It is only by its judicious and careful employment that any good can be obtained from the use of electricity: the careless or ignorant use of it may readily do more harm than good. It is essentially a remedy the use of which will for the most part remain in the hands of the specialist; it is of little use to the busy general practitioner, as the apparatus is complicated and expensive, and very considerable time and care must be spent in the application.

Massage has a much more limited use in pelvic inflammatory lesions, and is more dangerous in unskilled hands. It requires no especial apparatus. In the acute stages of the disease it has no place whatever, but its greatest use is in the chronic form, where there is a considerable quantity of unabsorbed exudate and lymph. The manipulations of the masseur act as exercise to the parts and stimulate absorption. Under careful and very gentle movements it can readily be seen why in this way pelvic masses disappear or become smaller. Its use is decidedly objectionable even in this class of cases, for the reason that it is impossible to say whether or no there be pus in the midst of the mass. Many a Fallopian tube which is not much larger than normal contains pus or purulent material. The application of friction, pressure, or kneading in such a case may readily result in the leakage of some of the tubal contents into the abdominal cavity: even were there is no purulent matter present, the manipulation might very easily relight a subacute or chronic inflammation into an acute attack. It is claimed for the treatment that the pus from a pus-tube may be caused to escape into the uterine cavity and a cure thus be effected: it is much more likely that the pus would first escape through the fimbriated ends of the tubes or rupture take place in the walls of the abscess. In addition to the dangers attached to its use, its application is very painful unless the greatest care or the most delicate touch is employed. Even then some cases are for a long time intolerant of the necessary handling of the parts. The treatment is altogether too dangerous for the general practitioner to employ, and its use will always be confined to the hands of the few. Massage in these diseases consists in kneading the pelvic masses and applying friction to them to cause their absorption, and in moving the uterus in different directions to stretch and free its adhesions. The manipulation is carried out with one hand pressing through the abdominal wall and one or two fingers of the second hand in the vagina. The vaginal fingers are used mostly for lifting up and fixing the uterus or pelvic masses; the manipulations are carried on in great part by the abdominal hand. The reverse is true, however, in exceptional cases.

When suppuration has accompanied an attack of pelvic inflammation, the treatment which has been detailed, and which is applicable to some cases of the disease in its non-suppurative and non-cystic forms, is not to be considered. In these cases all the symptoms of septicemia are added to those which accompany the inflammation, and frequently the patient's life is threatened, if not immediately, at least remotely and constantly. Should the pus be confined to the Fallopian tubes, Nature occasionally relieves the danger by allowing it to escape into the uterine cavity. It has been proposed to take the hint from Nature as to the method of treating pus-tubes, and accordingly the treatment of aspirating the Fallopian tubes by passing an instrument into the uterus, and thence into the tube through its occluded uterine opening, has been advocated. Could the procedure be carried out with any degree of safety and certainty, it would offer a method of cure in a certain proportion of cases which would at times be satisfactory, and at the same time not be attended with the dangers of abdominal section. The objection to the treatment which should condemn it to oblivion is the uncertainty, nay almost impossibility, of passing the instrument. The catheter or probe, whichever it be, is of necessity small in diameter—so small that it would be just as liable to perforate the diseased and softened uterine wall as the occluded opening in the tube, even if the point which that opening occupied could be found: the manipulations necessary to accomplish the operation would be attended with so much traumatism and movement of the diseased parts that the inflammatory process might very readily be relighted or an abscess-cavity ruptured. If for no other reasons, the treatment should be utterly condemned; but pelvic abscesses are so notoriously multiple that the mere emptying of one of these pockets of pus would have no effect on those remaining, and there would be no

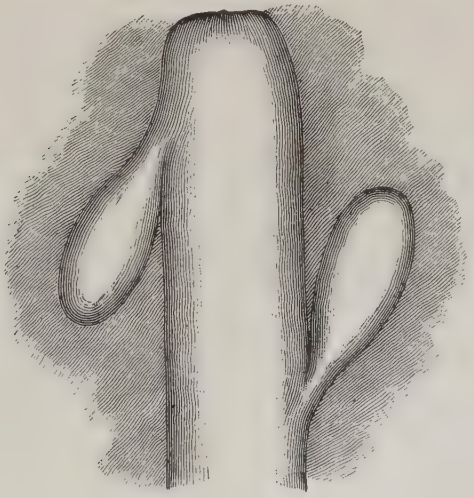
Fig. 307.



Drainage of Pelvic Abscess from the Vagina.

possible way of assuring one's self that some accumulation did not remain behind, it matters little how many had been drained. Where pus exists in the pelvis, there is but one treatment to be considered: evacuation by a surgical operation. A pelvic abscess should never be given an opportunity to evacuate itself. There is a point of election for the opening which, if left to Nature, will rarely be chosen. When pus exists, it should be evacuated at once; delay is unjustifiable, either for building up the patient or for any other reason. The patient will not improve as long as she is continuously absorbing septic matter, and the longer the delay the worse will be her condition for operation. If the abscess be an accumulation of pus within the pelvis *independent* of the Fallopian tube or ovary, be it either altogether intra-peritoneal or involving the cellular tissue, it is best to evacuate it without opening the general peritoneal cavity: the vagina is the one point at which this is feasible and proper. Even in those exceptional cases where the abscess has risen into the abdominal cavity, and it is possible to open it above the pubis without entering the general peritoneal cavity, the vagina offers the better point of operation, as it gives just as good an opportunity for irrigation and a better one for drainage. This of course presupposes that disease of the uterine appendages has been excluded—a diagnostic feat which is rarely accomplished. The opening should never be made in the rectum, as has been proposed, even though the abscess be pointing there. The abscess-cavity can neither be

Fig. 308.

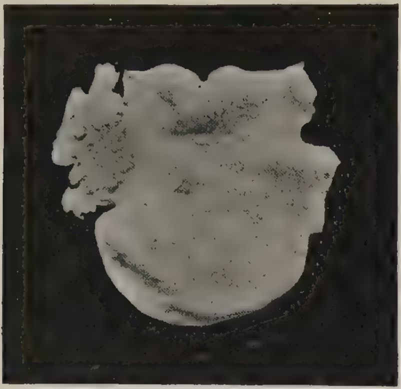


Abscess-sacs opening into the Bowel. Opening obliquely above and below the level of the sac.

easily irrigated through the rectal opening nor can fecal matter be prevented from entering into it. Even where the opening occurs into the rectum spontaneously, it is slow to close, if it ever does so. Where the opening is higher than the sacs, it is practically impossible to prevent fecal matter from entering, in which case closure is hopeless. There is one almost insurmountable obstacle to this method of treating pelvic abscesses, barring exceptional cases. It is rare that one is able to say whether or not the ovary or Fallopian tube contains pus. Should they do so, a secondary abdominal section would become necessary, and it would then be complicated by the fistulous opening, which is always serious and which might prove fatal. As a matter of fact, the cases of pelvic abscess without ovarian or tubal suppuration are rare, and the inferences are all in favor of there being involvement of these organs, especially when the etiology of the disease is taken into consideration. In view of these facts, the proper treatment of pelvic abscess is almost invariably by abdominal section, under which circumstances the parts can be readily explored, the exact pathological condition noted, and the appropriate treatment applied. The operation from above amounts to little more than opening an abscess, and the certainty of complete evacuation that it gives the operator and patient is a great desideratum.

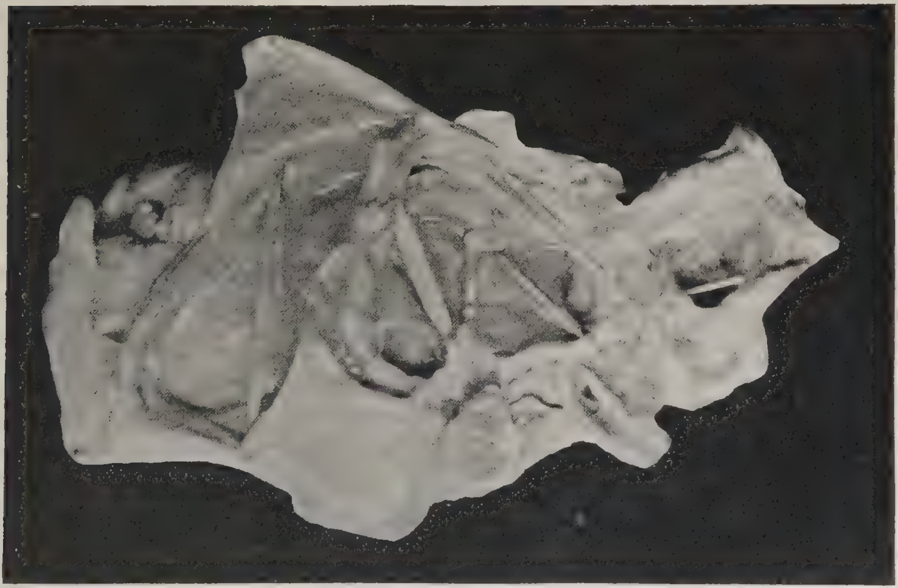
Where the pus is confined in the Fallopian tube or ovary, it has been recommended that vaginal puncture be practised for its evacuation. This method of treatment is so faulty that it is best never to recommend it. Where vaginal puncture would probably be the better procedure for unskilled hands in a general pelvic abscess, especially one which required such immediate evacuation that a skilled operator could not be obtained, it is never justifiable in abscesses confined to the uterine appendages and the lymph immediately surrounding them. As has been already said, this variety of pelvic suppuration is rarely confined to one cavity, but consists of a number of small pockets, none of which communicate with the others. The Fallopian tube itself may contain as many as three distinct and separate pockets; the ovary forms a cavity of its own, and two or more pockets are often found in the lymph in which the Fallopian tube and ovary are buried. The chances of more than a partial evacuation of the pus being obtained would be very scanty indeed. This objection has been recognized even by the advocates of this method of treatment, and for the purpose of overcoming the difficulty they have gone so far as to advise that the abdominal cavity be opened, the parts explored, the various abscesses located, and each punctured in turn from the vagina. If the abdominal cavity be opened, it would seem the height of folly not to complete the operation. But even with the abdomen opened it is at times absolutely impossible to locate all the abscess-cavities before the parts are enucleated. Even in the few cases in which the pus could be thoroughly evacuated the broken-down abscess-sacs, cheesy

FIG. 309.



Stricture of the Fallopian Tube: the ovary enlarged by chronic ovaritis.

FIG. 310.



Showing Multiple Abscess-cavities in a case of Pyosalpinx, demonstrating the uselessness of the treatment by tapping and draining.

Fallopian tubes and ovaries would remain behind to cause the patient a long chronic invalidism, even should she ultimately recover. The best results which one could hope to obtain from this method of treatment would leave the patient in exactly the same condition as a woman who had suffered from a pelvic inflammation, and after its subsidence had been left in a condition of chronic interstitial salpingitis and ovaritis. She would ever after carry a disorganized Fallopian tube and ovary, and would be liable to recurring attacks of pelvic inflammation, any one of which might result in suppuration or in death. Purulent salpingitis and ovaritis, unless they end in death in from a few days to a week, are chronic conditions, and give ample time to allow the physician to obtain competent assistance for performing an abdominal section.

The treatment of those rare accumulations of pus within the pelvis which are extraperitoneal, and which do not involve the uterine appendages, differs in no way, in its first steps at least, from the treatment of the intraperitoneal abscesses. It is impossible to make a diagnosis of this condition prior to an abdominal section. When the abdomen is opened and the abscess-walls are found to be movable enough to be brought into the abdominal incision, it is best to aspirate, empty the sac thoroughly, irrigate the cavity with hot water, stitch the opening in the sac to the abdominal incision, and place a drainage-tube into the cavity.

Should it be found that the sac could not be brought sufficiently high to be stitched into the abdominal wound, a vaginal incision should be made, the pus evacuated, and the drainage established from below. Until the abdomen has been opened and the diagnosis established this treatment is manifestly improper. Should it be thought desirable after the diagnosis has been established, a second incision could be made above Poupart's ligament and the abscess-cavity reached by dissecting down into the cellular tissue below the reflexion of the peritoneum, pushing the peritoneum forward, as in operations on the bladder or for ligating the iliac vessel, and in this manner reaching the accumulations. The vaginal opening, however, where possible, is to be preferred.

The ultimate treatment of pelvic inflammation is abdominal section in those patients who do not fully recover from the primary attack, and are left with their uterine appendages so diseased and disorganized that the symptoms produced by their presence either threaten life or so disable the woman as to incapacitate her for her daily vocation, and render her life a burden. It matters little whether pus be present or not, as many women suffer more from chronic interstitial salpingitis than they would from pyosalpinx or ovarian abscess. It would be well in the case of many patients, where there is no pus, to first try the medicinal treatment already described, but in this we are forced to make a distinction between the poorer and better-class patients. It has often been objected that no such distinction should be made, but it is well known that a given amount of involvement and destruction in a woman who can afford to undergo the time, trouble, and expense of a necessary course of treatment will give little or no permanent trouble, where a similar involvement in the case of a woman who is not able to afford the treatment will render her life miserable and will give rise to recurrent attacks of peritonitis, each one increasing the local condition and endangering the life of the sufferer. Even were they both to suffer the same amount, the rich woman can afford to go to bed and become a semi-invalid, while the same thing to the poor woman often means starvation for herself and children, or the poorhouse. Though the operation be a dangerous one, the physician is justified under such circumstances to counsel a poor woman to take the risks, with the chances of regaining her health and putting herself in a condition to bear the burden of life, where he would probably not think of advising the well-to-do patient to undertake the operation—not, at least, without a long and thorough trial of the medicinal—if it may be so called—treatment. If a patient's symptoms can be considerably ameliorated by treatment, she will often prefer to bear the lesser ills of her condition, than what to her are the greater ills of a surgical procedure. Unless a woman is subject to recurrent attacks of peritonitis, the disease may be left *in situ* without any danger to life, provided always that pus be not present: in these cases it is simply a matter of comfort or discomfort with a patient. Many of them suffer so much pain that they will accept an operation as soon as it is proposed to them, it matters little what the risk be, while in the case of others the idea of an operation is so horrible that they will rather bear any amount of suffering than even consider the radical procedure. The question of operation is one which must be left with the patient for decision after having fairly placed the facts before her. The dangers of an operation for pelvic inflammatory disease in the hands of trained gynecologists are not much greater than those which attend each severe recurring attack of peritonitis.

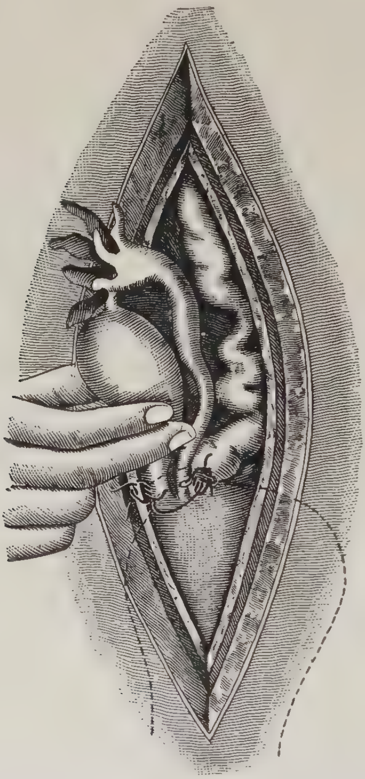
It is not possible to say just what the death-rate amounts to, but an honest investigation would find it not much below 10 per cent. in the hands of the many. In the hands of a few it reaches a lower limit. The fact that the woman is having recurrent attacks of peritonitis is one of the strongest indications that an operation for the removal of the appendages is required. It is not possible to lay down any hard-and-fast rule by which one may be guided in deciding for or against an operation; each patient presents her own individual peculiarities, which must be taken into consideration. It can only be said that as long as the diseased appendages remain in the pelvis the woman is not cured: she is only relieved for the time, and at any moment a new attack of inflammation may be lighted up and the original condition be reproduced.

The Operation.—Abdominal section is the only method of removing the uterine appendages in pelvic inflammatory diseases, whatever may be said of their removal by other methods for other conditions. Their removal by the vaginal operation is extremely difficult and in many cases would be impossible. The operation is divided into two stages: the opening of the abdominal cavity, and the removal of the appendages. The preliminary step, opening the abdominal cavity, is common to all abdominal operations, and needs no particular enunciation here. There is no danger to be met with until the peritoneum is reached, and then only in case there is adhesion of the omentum or intestines. This fact can be readily determined by picking up the peritoneum between two pairs of hemostatic forceps, and rolling it between the fingers. The merest nick will allow the air to rush in, when if the intestines are not adherent they will drop back into the abdominal cavity. If either the omentum or the intestines are adherent to the parietal peritoneum, they are to be carefully separated by gradually inserting the finger between them. The omentum may be found adherent over the inlet of the pelvis and greatly thickened by inflammatory infiltrate. If such be the case, it must be gently freed with the fingers, care being taken not to tear the bladder or the adherent loops of intestines. It is usually easy to begin at the lower edge of the omentum to free it, working upward from the pelvis toward the umbilicus. When it is tightly adherent to the bladder and its lower border cannot be clearly defined, it is well at times to begin above and work down toward the pelvis. The finger should be passed high enough in the abdominal cavity to reach a point where the omentum is free; then, with the finger between it and the intestine, it can be separated with more safety than from below: if when the bladder is reached there is any uncertainty as to where that organ ends and the omentum begins, as is at times the case, the apron can be ligated and separated at a safe distance above the doubtful point.

If when the omentum is loosened it is found that it is sufficiently torn to cause free bleeding, the oozing points should be caught up with a pair of hemostatic forceps and ligated. Should there be a number of bleeding points, time will be saved if a ligature be thrown about the omentum above these and the included portion amputated. This is of especial importance and advantage if it is thickened by inflammatory deposits. After having disposed of the omentum, the intestines must next be dealt with. If they are unadherent, the finger passes down through them into the pelvis, locating first the uterus, and then the Fallopian tubes and ovaries. Should the intestines be found adherent, they must first be carefully but completely freed from all points of attachment. The adhesions may exist at but a few points, and be easily broken; on the other hand, they may be most extensive, and so solid that separation can only be accomplished with great difficulty and danger of rupturing the bowel-walls. Every loop of intestine which overhangs the pelvis, even the vermiform appendix, has been found to be involved in the general mass. The separation of these, especially if deep in the pelvis, is much facilitated by using the sight in addition to the touch. One of the great advantages of this is that the operator can be absolutely sure of what he is dealing with, and can see any commencing tear in the bowel-wall in time often to avoid a serious injury. The elevated hip—Trendelenberg—position allows the use of both touch and sight, and any surgeon who would willfully neglect the advantage to be derived from the combined use of these two senses does not do his whole duty to his patient. It is in this point of separating adherent intestines deep in the pelvis that the position gives its greatest advantage and becomes invaluable. The adhesions are freed by one finger being gently but firmly inserted between the first knuckle of intestine which is adherent and the organ to which it is fast. A to-and-fro motion will often succeed in loosening it when a steady pressure at one point will accomplish nothing. If the adhesion is stubborn at one point, the finger glides to another and another, until it finds a weak point from which to begin: after the beginning is made the rest is comparatively easy.

At times it will yield easily on top; at others the first point of weakening will be found by passing the finger to the sides or even under the part. As each knuckle is freed it should be brought into the abdominal incision and carefully scrutinized. The points at which the adhesions existed will be found stripped of their peritoneum: if these points are small and not bleeding, they may be ignored; if bleeding freely, a few superficial stitches of silk or catgut will bring the edges of the peritoneum together and stop all flow. Exposure to the air for a short while may in itself stop it. If the serous and muscular coats are both torn through, stitches should be placed so as to turn the doubtful point into the bowel, and any possible danger of future perforation at these points will be obviated. When the intestines are all freed and properly treated, they, together with the omentum, are crowded back toward the diaphragm and a large sponge placed in the abdomen, so as to keep them out of the pelvis while the operation is completed: the sponge does the additional duty of absorbing any blood or septic material which may flow toward the abdominal cavity during the course of the subsequent manipulations. Should the bladder have become injured, it should be repaired before proceeding further. Each and every step of the operation is to be fully completed before proceeding to the next, so that no point in the technique may be forgotten in the final steps of the operation, or complications will arise to embarrass the subsequent steps. It is well to locate and note the condition of both appendages before beginning their enucleation, and usually it is best to free both of them and the uterus before beginning to place the ligatures. If this be done, the parts can be brought more fully and easily into the abdominal incision, and there will be less likelihood of the first ligature becoming loosened while adherent parts are being separated on the opposite side. In the enucleation the finger glides about over the parts until it finds a weak point or a point at which it can be passed down deeply into the pelvis. It is essential that this should be posterior to the broad ligament, between it and the sacrum. The Fallopian tubes and the ovaries are situated on the posterior surface of the broad ligament, and the adhesions will almost always be found at this point. The finger should glide between the appendage and the sacrum. It is well where possible to follow the curve of the sacrum, keeping the palmar surface of the finger—or fingers if two be used—toward the pubis, sweeping the finger from one side of the pelvis to the other and in this manner freeing all adhesions to this bone. This will allow the fingers to pass under the ovaries, tubes, and uterus if it be retrodisplaced, and they can be stripped loose and lifted out of the pelvis with comparative ease. The aim should be to get the finger to the lowest point in the pelvis and work upward, and not from above downward. However, at times one is forced to work first at one point, and then abandon it and go to another and another, coming back finally to the original one. It is only by educating the fingers to the work that it can be performed accurately. In making the enucleation care should be taken to do as little damage as possible to the broad ligament, as it bleeds freely wherever injured. It may be necessary at times to ligate the one side before enucleating the opposite one, on account of the bleeding. If this should be the case, care must be taken not to loosen the ligature while completing the work. As soon as the appendages and uterus are freed the ligatures are to be placed and the diseased parts removed. The Fallopian tube and ovary are caught firmly in one hand and drawn well through the abdominal incision, while the other hand passes the pedicle staff containing the ligature through the broad ligament, it being well to pass it below the loop of the round ligament, which will be readily observed on the anterior aspect of the tense broad ligament. If this be done and care be taken not to cut the loop of the round ligament when the Fallopian tube and ovary are removed, there will be less danger of the ligature slipping from the stump. As soon as the ligature staff has perforated the broad ligament the staff is withdrawn and the silk left *in situ* as a double ligature; the double end is then cut, and hangs as two separate threads perforating the broad ligament. The two strands of silk are so twisted that when their respective ends are tied, one around each half of the mass, they form a figure-of-eight, each half compressing one-half of the pedicle, and the two halves being drawn closely to each other. While placing the ligature the broad ligament should be held well up into the wound, but as the knots are tied tightly, the assistant who is holding the mass should relax his hold and allow the broad ligament to retract, else when the mass is cut away there will be a strong tendency on the part of the broad ligament to pull down through the ligature, thus causing hemorrhage. Care is to be taken that the Fallopian tube is included in the ligature up to the uterine cornua. In some cases it is necessary to include uterine tissue in order to get a pedicle healthy enough to hold the ligature without cutting through. Frequently the ligature cuts through the pedicle like a knife, completely amputating it. It becomes necessary then to pass a ligature, by means of a curved needle, deep into uterine tissues at the cornua in order to control the bleeding. The same proceeding may become necessary on the side of the pelvic wall. It is a serious question whether in such cases the proper treatment is not found in the complete removal of the uterus, together with the appendages. Patients with such lesions, when the appendages alone have been removed, are very prone to return for treatment, suffering with leucorrheal discharge, pain, and continued bleeding: the uterus in such cases is often found to be still enlarged, and the writer has on several occasions been compelled to remove it in order to secure a cure.

FIG. 311.



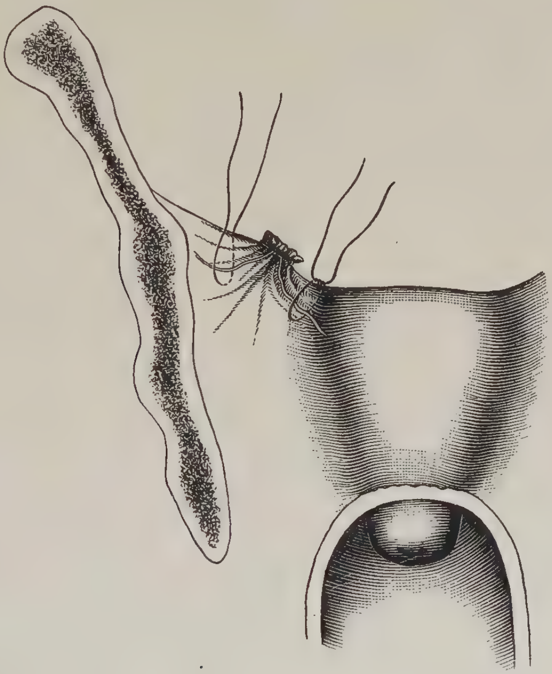
Ligation by Figure-of-eight Ligature of the Fallopian Tube and Ovary.

The Staffordshire knot, or the so-called Tait knot, is an exceedingly dangerous one, and should be avoided, especially by beginners. The knot is so complicated that it is difficult to tie, and should any one part of it be inaccurately and lightly applied, the whole loop is liable to become loose. Occasionally the pedicle is so large that it is not safe to include it all in one ligature. It is then best to tie in sections, quilting it from side to side as the cobbler does in his work. When the ligature has been firmly secured, the Fallopian tube and ovary are cut away, leaving sufficient of a button to ensure that the ligature will not slip off. After cutting away the appendage the stump should be seared with a Paquelin cautery as an antiseptic precaution. There is always a small portion of the lining membrane of the tube protruding from the centre of the stump often containing septic matter, which it is much safer to destroy than to leave free in the torn and denuded pelvis. When the ligatures are tightened, usually all free hemorrhage ceases and the only bleeding is merely an oozing, which will stop of its own accord in a short while. It may be advisable to place a ligature about some point which bleeds with especial freedom, but usually one or two of these at most are all that will be required. The points which will be most persistent and troublesome are those on the uterine surface. Wherever they are, if they are picked up with a pair of hemostatic forceps, and a ligature carried under them with a curved needle, they can be readily controlled. There should be no hemorrhage during the enucleation which is alarming, and generally it is better to ignore entirely what there is and finish freeing the adhesions with the certainty that the bleeding will end as soon as the ligatures are secured about the pedicles. Should the bleeding become alarming, it is because the ovarian artery has been severed, and it is best to secure the vessel by passing a ligature around it. If a needle be passed through the broad ligament near the pelvic wall and the ligature secured, and another one through the broad ligament near the uterus and secured, the vessel will be caught at both ends. The enucleation may then be finished and the mass tied away in the usual manner. There is neither necessity nor occasion for packing the pelvis with gauze or sponges to control hemorrhage during the course of the enucleation: such a procedure is not needed in the case of venous bleeding, and can only delay and impede the operation, while in arterial bleeding it will only control the hemorrhage as long as the pressure is kept up. The bleeding vessel must be ligated as soon as the gauze is withdrawn, and the result of its use is simply the loss of valuable time.

If during the course of the enucleation the Fallopian tube or ovary, or both, be found distended with fluid, either purulent or otherwise, it may be well to empty them with the aspirator, so as to avoid their rupture during the operation, and consequent soiling of the torn and bleeding parts with septic matter. If possible, however, it is better to remove the tumor without emptying it, as an enlarged ovary or Fallopian tube is easier to handle and enucleate than a small or collapsed one: care should be observed, however, not to rupture it. Should it rupture and the parts become bathed with the contents, or should one or more pus-pockets be found in the lymph surrounding the appendages and evacuated into the general pelvic cavity, the parts must be thoroughly washed out and all traces of the fluid removed. If the intestines and omentum have become soiled, they must also be carefully washed. For this purpose a long-nozzled irrigator is carried to the bottom of the pelvis, and several gallons of hot water are passed through it. To carry out this procedure two fingers of the one hand are placed in the upper angle of the abdominal incision to hold the intestines back toward the abdominal cavity; the nozzle of the irrigator is then pressed toward the lower angle of the incision; a funnel is thus formed through which the water from the bottom of the pelvis gushes freely, bringing with it all the pus, blood, and other débris which has been left there. The heat of the water acts in addition as a good hemostatic to the oozing points, and tends also to combat any threatened shock. While the irrigation is being carried out the fingers should play freely among the intestines, washing them thoroughly. Before closing the abdominal wound a last look at the stump should be taken in order that any tendency to slipping or loosening of the ligatures may be noted and corrected. Should there be any doubt about their perfect safety, a ligature can readily be thrown around the ovarian artery on each side of the stump with the aid of a curved needle, thus rendering assurance doubly sure. It is seldom during the course of an operation of this kind that the ureters are injured: such accidents have happened, however, and this possibility must always be borne in mind. When large surfaces of peritoneum have been denuded and there is free oozing, when septic matter has soiled the seat of the operation, or where a bowel has been badly damaged, drainage is always indicated. Drainage is probably more often required in this class of operations than in any other in abdominal surgery. A drainage-tube of glass or gauze is passed to the most dependent point in the pelvis and brought out through the lower angle of the abdominal incision. The incision is closed, preferably with a silkworm-gut suture, although the character of the suture is immaterial, provided it is surgically clean.

Frequently during the course of an operation the question arises whether or not certain parts should be removed. If it be necessary to remove the Fallopian tube on one side, its accompanying ovary had better go with it, and *vice versa.* Either Fallopian tube or ovary by itself is useless, and both are possible sources of future danger. Should the appendages on one side be healthy, it is unwise to remove them together with the diseased ones on the opposite side, for the reason that it renders the woman sterile and brings on the menopause with all its attending nervous phenomena. In spite of the fact that some good surgeons contend for the removal of both ovaries, it is better that the patient take the risk of a second operation for the removal of the remaining one if in the future it become diseased. If the Fallopian tube is not already diseased, there is no good reason that it will become so if after recovery from the abdominal section the lining membrane of the uterus be treated and the

Fig. 312.



Stump after removal of Uterine Appendages, showing double ligation of Ovarian Artery.

endometritis cured. It becomes necessary, in any event, to adopt this course in many cases after the appendages have been removed, in order to secure a complete recovery. The disease originated in the uterus, and the fact that it has spread to the Fallopian tube and the pelvic peritoneum is no reason why it does not still exist intra-uterine. As a matter of fact, many of these patients are not cured until the womb has been curetted and treated by alterative and stimulating applications.

The question often arises as to whether an operation should be performed in the presence of an acute peritonitis. If one have the choice, it were possibly best to operate in the quiescent state; but if any indications for a speedy operation exist, no hesitation need be had on account of the inflammatory attack; its cure will be assured on the removal of the appendages. The large masses of plastic lymph which accompany it are broken down and disappear in the course of the enucleation: within twenty-four hours the pulse and temperature, which were high at the time of the operation, approach the normal, and the patient convalesces within forty-eight hours. Neither need menstruation be a bar to operation. When both appendages have been removed, there is always a spurious menstrual flow within two days after the operation. The only possible disadvantage would be that the operation might be slightly more bloody on account of the pelvic congestion—not, however, more than if an acute inflammatory attack were in progress.

Where both appendages have been removed, the menopause usually becomes established. There are, however, frequent exceptions to this rule, and patients return to the surgeon complaining that they are bleeding at regular intervals, and just as profusely as before. The cause for this has not been satisfactorily explained as yet. The explanation has been advanced that a small ganglion of nerves existed at the angle formed by the junction of the Fallopian tube and the uterus, and that there had been a failure to include and remove this ganglion with the appendage. Practical experience has long since proved the falsity of this theory. It has again been contended that an ovary—a third one—was left behind, but this has also been proved to be untrue: these cases of continued bleeding are quite frequent, while but few men have ever seen the mythical third ovary, in spite of the fact that an eminent German authority states in his book that it is possessed by about every tenth or twelfth woman. Some few of these patients are relieved of the flow by a thorough curetting of the endometrium: in others this procedure has no effect. Usually, after a shorter or longer interval, menstruation, which at first remained fairly regular, becomes scanty, and finally disappears, the cause for its continuance remaining a mystery.

The relief following the removal of the uterine appendages is not always the same, nor is the best result obtained immediately. If it is only necessary to remove one side, the menstrual function continues much the same as usual, and many of the benefits of the operation are realized at once. Of course the aches and pains, which occur more from habit than from any real lesion, continue to a certain extent until the patient returns to a good condition of general health. This requires time and building up. Should both sides have been removed, all the nerve-symptoms of the menopause appear within a few weeks after the operation, and the woman oftentimes feels worse than before the operation was performed. The menopause, which is artificial under these circumstances, assumes a shorter and more stormy course than when the woman changes naturally. The best effects of the operation cannot be expected until this time is past, which may not be for a year or two. The immediate relief from pain, however, is marked, and, although the woman is not altogether well, she is relatively and comparatively so: where she was a chronic invalid before, she is now able to be about and attend to her daily duties. The great trouble with surgeons is that they expect too much from the operation, and lead their patients to do the same. This is a great mistake. So much local damage has been done by the inflammation, and the general health is so wrecked, that the woman will never again be the same well woman she once was: such a result is neither to be expected nor obtained in very many instances. An absolute cure should never be promised; only relative results can safely be counted upon.

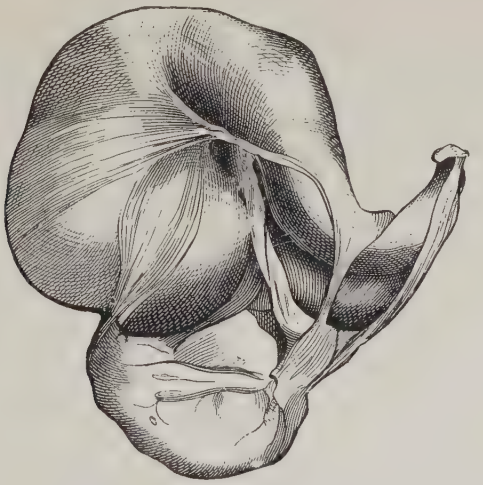
The pain which so often remains with the patient after the operation cannot always be accounted for. At times the omentum or intestine may become adherent to some denuded spot or to the stump. The dragging, incident to the peristaltic action would then give rise to pain. Frequently it is due to intestinal colic or to the compression of the nerve-filaments by the ligature. In some cases it is impossible to account for the pain on any other ground than that it was not originally caused by the ovarian or tubal disease, but resulted essentially from a nerve-disease from the first. An operation for the removal of the uterine appendages for pain as the only indication is rarely justifiable. Whether or not there has been a pelvic inflammation, the surgeon should always be able to demonstrate positive disease of the Fallopian tubes and ovaries by a bimanual examination before counseling a surgical operation for their removal. The pain may be the result of a pelvic inflammation, but it does not follow that the removal of the appendages will cure this symptom, unless the appendages are diseased and can be shown to be the seat of the suffering.

Some of the worst and most hopeless cases of pelvic inflammation recover after an operation. This is particularly so in pus cases. It is surprising to note how quickly they rally even when they have appeared to be most desperate. For this reason no woman should be refused the chance of recovery because she may seem too far gone for relief: unless she be actually dying there is hope, and a conscientious surgeon should offer her the last chance, forlorn as it may seem. The operation often means little more than the opening of an abscess, but, whatever it amounts to, a short etherization and a short operation frequently makes the difference between life and death with a patient: what is done should be performed as quickly as is compatible with safety, and the patient gotten back into bed. Should the enucleation give promise of being a long or hard one, and the patient apparently unable to stand it, it were better to empty out the pus and place a drainage-tube, leaving the completion of the operation to some future time when the woman is better able to sustain the shock of the necessary manipulations.

From time to time different substitutes have been sought for the removal of the appendages in pelvic inflammation. It has been proposed to open the abdomen, break up all the adhesions, and allow the parts to remain *in situ.* Again, it has been stated that it was proper to free the adhesions of a Fallopian tube containing pus, and squeeze the pus into the uterus by stripping the tube with the fingers. The fimbriated end of the tube being cut away and its cavity washed out, the cut end is then stitched into the abdominal opening or the mucous and serous membranes brought together over the denuded portion. All manner of such procedures have been practised in the name of conservatism, each and every one of them being, in fact, more tedious and more dangerous than the complete removal of the diseased and destroyed appendages. The only justification of such surgery would be subsequent pregnancy. As yet there is little reported which is encouraging from that standpoint. To open the end of the Fallopian tube, which Nature has sealed to prevent the further escape of infectious matter, is only to invite the infection of the whole pelvic, if not abdominal, cavity. Fortunately, Nature again seals the opening with plastic lymph within a few hours after it has been returned to the abdomen, and the whole procedure has been nullified as far as the results expected are concerned. Such surgery is useless in this class of diseases, and can only end in disappointed hopes. The moment the parts are returned to their position in the pelvis they re-adhere.

Is there, then, no hope of a cure for these women short of the removal of the appendages? If they are able to bear their sufferings until the change of life is established, Nature will effect a cure. Pelvic inflammatory disease is essentially an affection of youth and middle age; it seldom occurs in virgins or after the change of life. After the menopause it gradually becomes inactive, and finally ceases to give rise to any symptoms. As to whether or not a patient be advised to wait for this natural cure will depend much upon her suffering, the length of time she has to wait, the condition of her general health, and her station in life. A well-to-do woman could readily tide over a few years more or less with comparative comfort and safety, while her less fortunate poor sister would be forced to call upon the surgeon for relief.

Fig. 313.



Pyosalpinx from a Woman over Sixty Years of Age.

The changes which take place in a woman following the removal of both uterine appendages are the same as follow the natural change of life—none other, none less. The woman is sterile; she was sterile at the time of the operation, and would never have been anything else. Often the sexual appetite is increased; never diminished, as is commonly supposed. The increase is simply the return of the woman's natural condition. Her pain and suffering and ill-health had inhibited the sexual appetite; these being removed, the appetite returns in full force. Gradually over the course of years the appetite fades in exactly the same manner as it does following the natural menopause. In some women it is lost in a few years, in others not for many. The woman takes on a growth of flesh and becomes more matronly; otherwise there is no change—no coarseness, no growth of hair on the face, no harshness of the voice, no masculine appearance.

As a result of neglected pelvic suppuration, pus frequently finds its way to the surface and discharges; oftener the patient dies of exhaustion and septicemia before this result is attained. Fistulous openings may appear in the rectum, the small intestines, the vagina, the bladder, the perineum, the abdominal walls, and the gluteal region. If the abscess has been unattended with involvement of the uterine appendages, sinuses will probably close and all signs of suppuration cease. If, on the other hand, the appendages are involved in the suppurative process, as they most frequently are, the sinuses will remain open in spite of all that may be done by way of medical treatment; the discharges continue, and the patient gradually becomes more and more exhausted and emaciated, until she finally becomes bed-ridden, and dies after a long period of suffering and misery. The treatment of such cases is unpromising. Abdominal section with removal of the abscess-sac is the only alternative, however bad the case may be. When the pelvis has been cleansed of the diseased appendages which form the focus of suppuration, there is of course a sinus opening into the pelvic cavity. This is a source of great and threatening danger to the woman for the first twenty-four or forty-eight hours after operation, but it is a risk which she must necessarily assume: there is no avoiding it. The sinus should be well irrigated from within the pelvis outward in whatever direction it runs, and it should be disinfected as thoroughly as possible throughout its whole course. If it passes through any considerable amount of tissue, it is well to introduce a drainage-tube into its outer end, so as to ensure the flow of suppurative material away from the pelvic cavity. The mouth of the sinus in the pelvis is to be thoroughly scraped, cleansed and closed by a few catgut stitches. Nature will in a few hours add additional barriers to any infection entering the pelvis by sealing the opening with plastic lymph. Should the opening be into the bladder or bowel, the edges of the perforation are to be carefully prepared and closed with stitches. It is possible that the condition of the bowels will be so bad that in the case of the small intestine a portion must be resected. When the opening is too low down in the rectum for closure, a drainage-tube must always be placed at the point of opening, and the bowels kept perfectly quiet with opium for three or four days, so that no fecal matter may escape before the opening is sufficiently closed by lymph. It is possible in a goodly number of these extreme cases to get a good result, and when the patients do pass through the operation safely, it is surprising to see how quickly they regain their health up to a certain safe point. At times they are so badly wrecked that perfect recovery is a matter of years. The adhesions are so extensive and dense, the patient in such a low physical condition, and the damage to viscera so irreparable in many cases, that they are unable to stand the necessarily prolonged operation or they succumb to septic peritonitis. This, however, should be no reason for staying the surgeon's hand as long as he can give a reasonable chance of cure to a respectable proportion of such cases. These cases invariably die if left alone, and each one cured is a life snatched from the grave.

The sooner the general profession becomes thoroughly imbued with the vast importance of the whole subject of pelvic inflammation, and acts intelligently upon the principles here laid down, the sooner will we have to face a less number of such terrible examples of neglect and ignorance.

ECTOPIC GESTATION.

Definition.—By the term "ectopic gestation" is meant a pregnancy situated outside the cavity of the uterus, and the title *ectopic* is preferred to that of *extra-uterine,* as including, also, pregnancy in the interstitial portion of the tube, which, while ectopic, is not outside of the uterus.

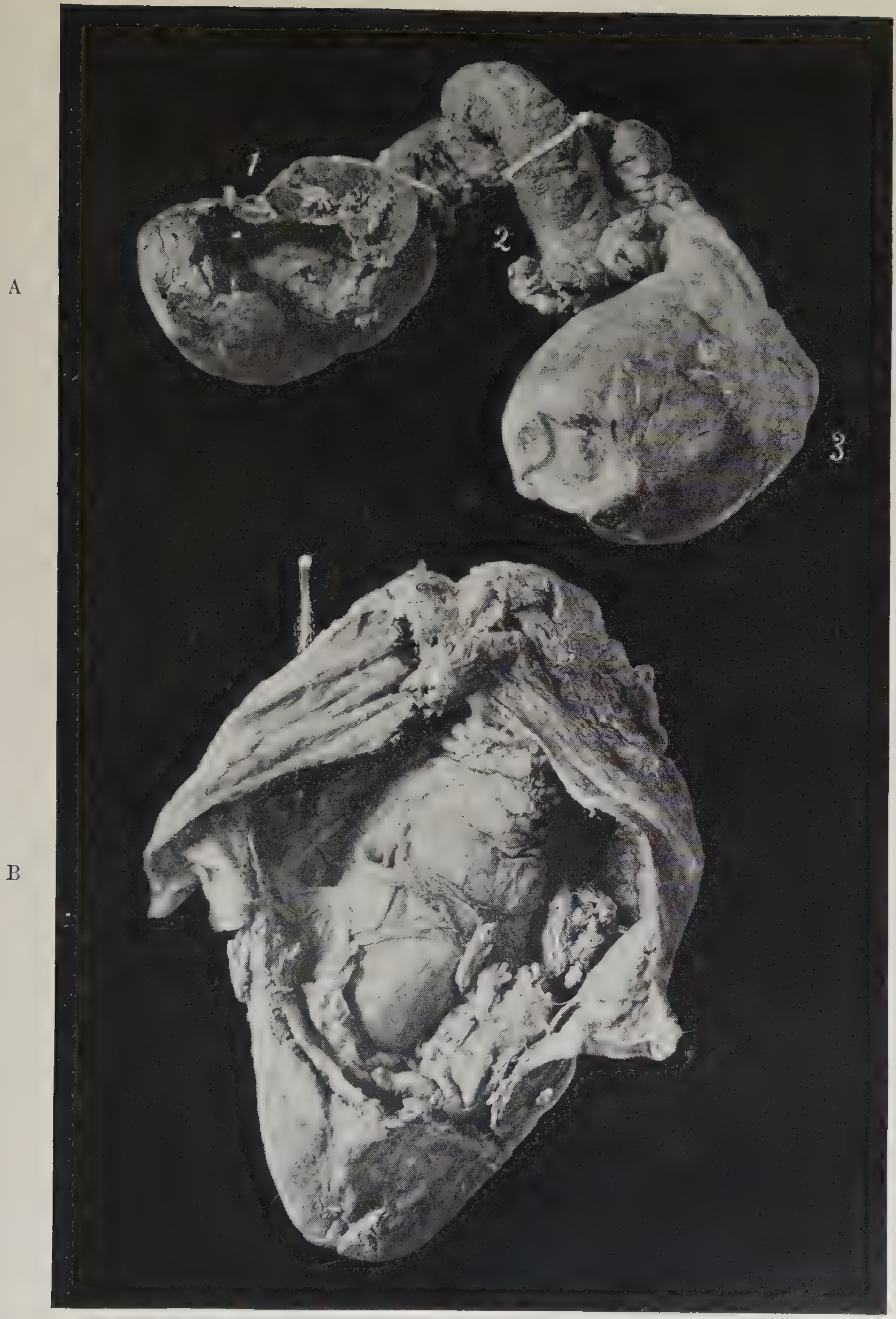
Cornual pregnancy will not be included in this article.

History.—We shall not enter into the history of the subject, save to say that Albucasis, in the middle of the eleventh century, described the first known case of ectopic gestation. For centuries it was considered one of the rarest of Nature's freaks, but since March 3, 1883, when Lawson Tait of Birmingham, Eng., performed his first successful operation on a case of ruptured ectopic gestation, examples of this condition have been observed so frequently that the literature of reported cases is voluminous, and to Tait and his views of the etiology and treatment of pelvic hematocele is largely due our knowledge of the subject now before us. Instead of regarding the condition a rare one, we know now that it is comparatively frequent, and that every gynecologist in active operative practice must meet with several cases each year. Formad of Philadelphia, in a series of 3500 general autopsies, found 35 ectopic gestations.

The relative frequency of this condition at the present time, as compared with the past, simply means that we are now better able to recognize such cases; and many of the deaths formerly assigned to idiopathic peritonitis and to hematocele were undoubtedly due to ectopic gestation.

Varieties.—For all practical purposes we may regard the tube as the primary seat of the ectopic gestation. When the fimbriated extremity of the tube is adherent to the surface of the ovary and embraces one or more Graafian follicles, we admit the possibility, after rupture of the follicle, of impregnation of the ovum before it leaves the follicle, and its development within the ovary, constituting, in one sense, an ovarian pregnancy. Such an event, how-

PLATE XXXI.



Combined Ectopic and Intra-uterine Gestation; operation five months after marriage: A, tube and ovary removed at operation; 1, gestation-sac containing amnion and giving chorionic villi under the microscope; 2, fimbriated extremity; 3, ovary; B, fetus contained within its membranes, passed from the uterus on the day following the operation.

ever, if it ever occurs, would be so extremely rare that it may be left out of consideration in a practical work like this and *ectopic gestation* be regarded as *originally tubal.*

The idea that an "abdominal pregnancy" ever occurs primarily, as such, has been abandoned. It seems neither rational nor possible, when we consider the absorptive power of the peritoneum, that an ovum should drop into the peritoneal cavity, meet with a spermatozoön, and develop there. Knowing as we do how easily much larger and firmer masses are rapidly absorbed by the peritoneum, we do not believe that a young fertilized ovum would long escape destruction. We shall show later on how the condition called "abdominal pregnancy" originally started in the tube.

Three varieties of tubal gestation are recognized, according to the situation:

1. Tubal proper (free tubal);
2. Tubo-ovarian;
3. Tubo-uterine or Interstitial.

The first variety, that situated in the free portion of the tube, between the cornu of the uterus and the fimbriated extremity, includes by far the largest number of cases, and consequently is of the greatest importance.

The tubo-ovarian variety we consider as still *sub judice.* As usually described, it includes the condition where the fimbriated extremity of the tube is adherent to the surface of the ovary, and the gestation takes place in the outer extremity of the tube, between it and the ovary. This variety is rare, and, as the treatment would be similar to that of the first variety, and the diagnosis would in all probability only be made at the operation or the autopsy, they will be considered together. We shall see later on that the direction of rupture may differ in the two cases.

Careful observation of specimens of ectopic gestation removed by operation has largely modified the views held concerning the tubo-ovarian variety. In all probability cases have been reported as tubo-ovarian in which the ovary, just as coils of intestine or the uterus, simply formed a part of the sac created by adhesive peritonitis binding together adjacent organs about the blood-effusion, resulting from rupture of any portion of the pregnant tube.

In the tubo-uterine or interstitial variety the gestation occurs in that portion of the tube which is embraced by the uterine wall. This constitutes a distinct class, and will be considered separately.

ETIOLOGY.—Concerning the etiology of ectopic gestation very little is known. The theory which has gained the widest acceptance is, that it is due to some lesion in the interior of the tube obstructing the ovum in its passage to the uterus. This lesion is in some cases a desquamation of the epithelium, in some, a stenosis of the lumen by the traction of peritonitic adhesions, causing an angulated condition of the tube, and in others, a change in the epithelium short of desquamation, but sufficient to cause a departure from its normal function. The theory of lesion in the interior of the tube seems to cover a large number of cases, and is strengthened by the fact that frequently a history of previous trouble on that side of the pelvis can be elicited, and the event is often, though not always, preceded by a period of sterility: it is also supported by the theory that the normal site of impregnation is in the uterus, and that if the ovum is delayed and impregnated in the tube, ectopic gestation results.

In some cases of ectopic gestation, on the other hand, the microscope has disclosed in the epithelium no deviation from the normal.

This disaster may occur at any age: it may happen in a woman who has borne several children, or it may occur in the first pregnancy a few months after marriage.

As stated above, the event is often preceded by a long period of sterility, and yet it may follow a confinement by only a few months; in fact, it may accompany an intra-uterine pregancy. In this case the presence of the intra-uterine gestation may perhaps be the cause of the extra-uterine.

PATHOLOGY.—We must consider—

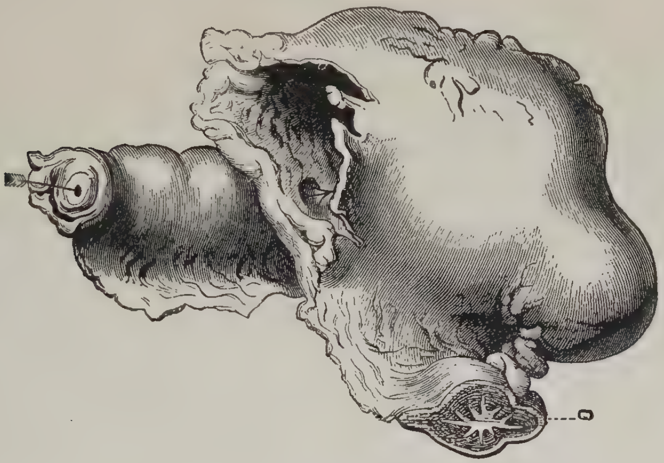
1. Changes which occur in the tube;
2. Changes which occur in the ovum.

Following the lodgment of the ovum in the tube, the wall of the latter at first thickens; this is chiefly due to its increase in vascularity, especially at the site of attachment. As the ovum grows the tubal wall becomes thinned and weakened by the ingrowths of the chorionic villi. Simultaneously with the growth of the ovum, the fimbriated extremity of the tube becomes progressively narrowed, until at about the eighth week it is completely occluded. The method of this occlusion has been accurately described by Bland Sutton. As the structures of the tube become swollen from the congestion, the peritoneal and muscular coats of the fimbriated extremity form a prominent ring about the fimbriæ; this ring gradually projects beyond the fimbriæ, then contracts and closes the ostium, leaving the fimbriæ within the tube concealed from view. Now, until this occlusion occurs, either one of two events is possible:

1. Rupture of the tubal wall;
2. Tubal abortion.

After the occlusion of the fimbriated extremity the ovum can escape from the tube only by rupture of its wall. As the chorion develops, the tubal wall, thinned by distension and weakened by the inroads of the villi, finally yields, the exciting cause coming either from without or from within the tube.

FIG. 314.



Gravid Fallopian Tube at the Tenth Week, showing complete occlusion of the ostium: *o*, ovary with corpus luteum.

(*a*) From without: As a misstep, lifting, straining, or, not infrequently, from sexual intercourse, as was proven to be the case in the patient from whom the accompanying specimen was taken, where the rupture immediately followed that event.

(*b*) From within: As a hemorrhage into the sac from separation of the tubo-chorionic vessels in the process of organic growth.

This rupture, when the gestation is situated in the tube proper, may take place in either of two directions:

1. Through a portion of the tube covered by peritoneum—viz. into the peritoneal cavity. (See Fig. 315.)

2. Through a portion of the tube not covered by peritoneum—viz. between the folds of the broad ligament—*i. e.* outside the peritoneal cavity. (See Fig. 316.)

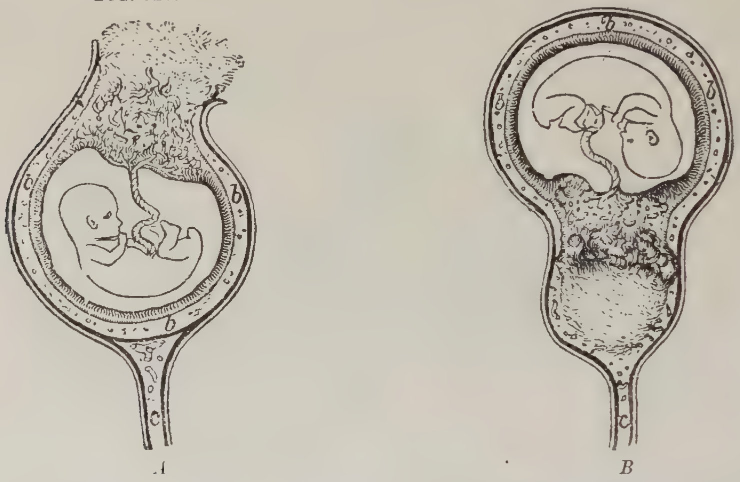
In the tubo-ovarian variety the direction of rupture would be into the peritoneal cavity only.

When a rupture takes place into the peritoneal cavity, either one of two events may occur:

(*a*) The hemorrhage may be sufficient to prove speedily fatal;

(*b*) The hemorrhage may be insufficient to prove speedily fatal. In the latter case the tubal laceration is small: the chorion in its attempted escape plugs the opening and checks further hemorrhage; the effused blood then gravitates to the pouch of Douglas, finally coagulates, and is roofed in by peritonitic adhesions. In this way a new false sac is formed. As the chorion grows this new sac is ruptured, with a second hemorrhage, which in turn may be fatal, or may be again arrested and the fatal flow postponed. This process may be repeated several times, or, indeed, if the effused blood is small in amount and the rupture occurs early, the effused blood, fetus, and membranes may be absorbed and the patient recover.

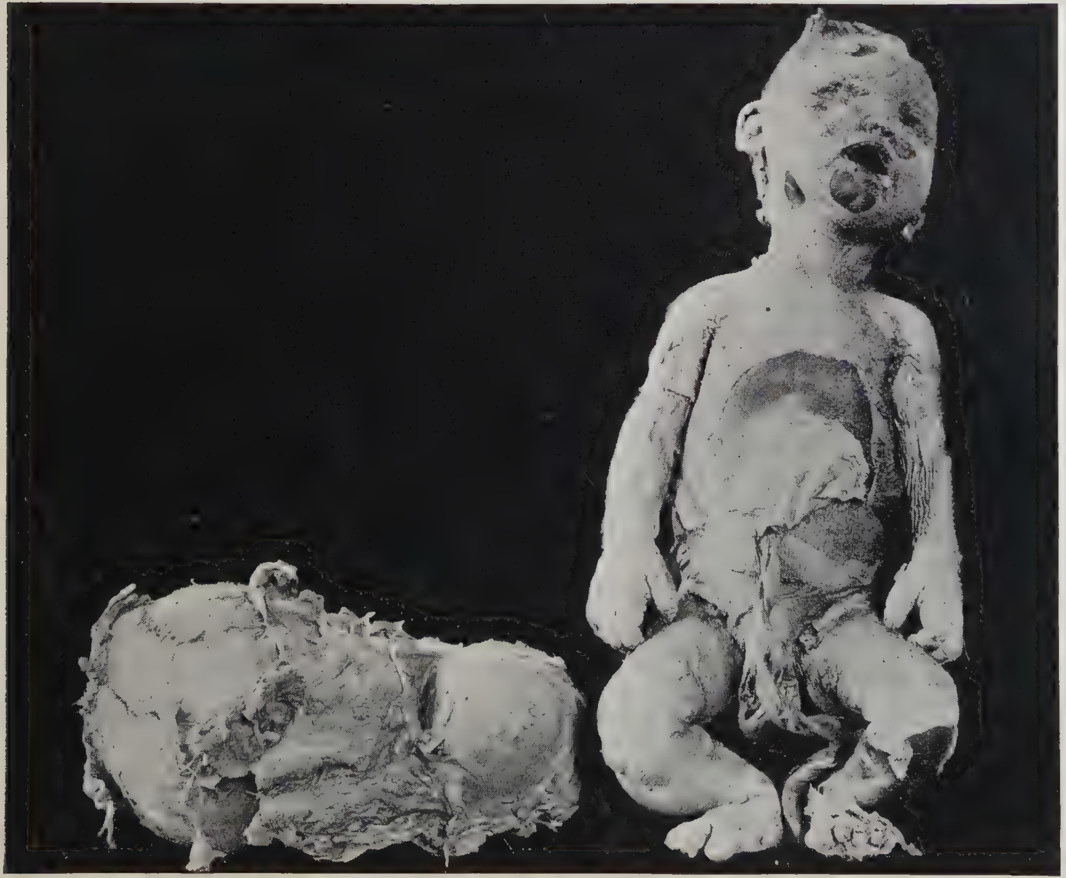
Fig. 315. Fig. 316.



Diagrammatic Section of Fallopian Tube, representing the two directions of rupture in tubal pregnancy: *A*, into the peritoneal cavity; *B*, between the folds of the broad ligament; *b*, wall of Fallopian tube; *c*, cavity of broad ligament.

The death of the fetus usually occurs with the first hemorrhage, but Webster reports and minutely describes a case in which the fetus escaped into the peritoneal cavity and went to term, the so-called placenta remaining in the tube. This may have occurred either by a marked distension and thinning of the tube, allowing the gradual escape of the fetus through the tubal wall, with little or

PLATE XXXII.



Full-term Fetus developed between the Folds of the Right Broad Ligament: sac torn in removal; partially sutured afterward; A, right tube opening out into broad ligament.

no hemorrhage, or the fetus may have gradually escaped through the fimbriated extremity—*i. e.* by tubal abortion.

When the rupture occurs through the floor of the tube, between the folds of the broad ligament, the death of the fetus also usually occurs at once.

Occasionally, however, the chorion only gradually changes its site of implantation, and the fetal circulation is maintained; fetal life continues, and may go to full term with complete development of the child.

Thanks to the frozen-section studies of Dr. Berry Hart, we now understand pretty clearly the changes which occur as the fetus develops. These changes were well exemplified in the case, the specimen of which is illustrated by the accompanying plate taken from a photograph. The folds of the broad ligament are opened out; the peritoneum is gradually lifted from the floor of the pelvis, from the lower portion of the rectum, and from the side, posterior surface, and fundus of the uterus. The uterus itself is enlarged, and usually pushed to the side opposite the gestation-sac.

The distance the peritoneum may be lifted from the pelvis and its contents without its rupture, by the gradual development of the fetus or by repeated hemorrhages beneath it, seems almost incredible to one who has not actually seen it either at operation or autopsy. This elevation not infrequently reaches to the level of the umbilicus or above, and explains how an incision may be made into the gestation-sac, to one side of the median line, without going into the peritoneal cavity. We say, "to one side of the median line," for although the peritoneum may be stripped from the side, posterior surface, and fundus of the uterus, it seems to remain attached to the anterior surface, especially at its lower portion, and an incision in the median line would usually go through the peritoneum.

The distension of the broad ligament and the elevation of the peritoneum is well shown in Fig. 317.

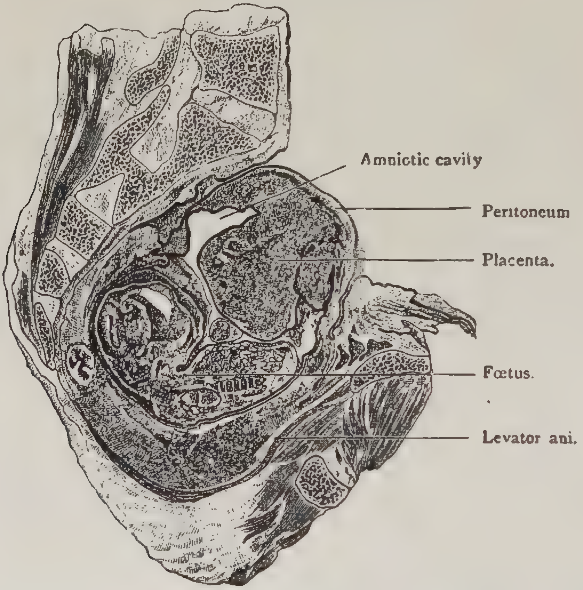
The amount of distension which the peritoneum forming the folds of the broad ligament will tolerate is sometimes exceeded, and a secondary rupture occurs into the peritoneal cavity, the primary rupture having taken place extraperitoneally—viz. from the tube down between the folds of the broad ligament; the secondary rupture from the broad ligament into the peritoneal cavity. Either one of two results may follow this event:

1. Profuse hemorrhage into the peritoneal cavity, with or without the escape of fetus or fetus and placenta;

2. The gradual escape of the fetus into the peritoneal cavity, with little or no hemorrhage, the placenta retaining its attachment within the broad ligament and the fetus perhaps continuing its existence.

The first result, profuse hemorrhage, is more likely to occur when the distension of the broad ligament is due to recurring hemorrhages, and will be referred to again as one of the possible indications for operation in the treatment of an extraperitoneal rupture.

Fig. 317.



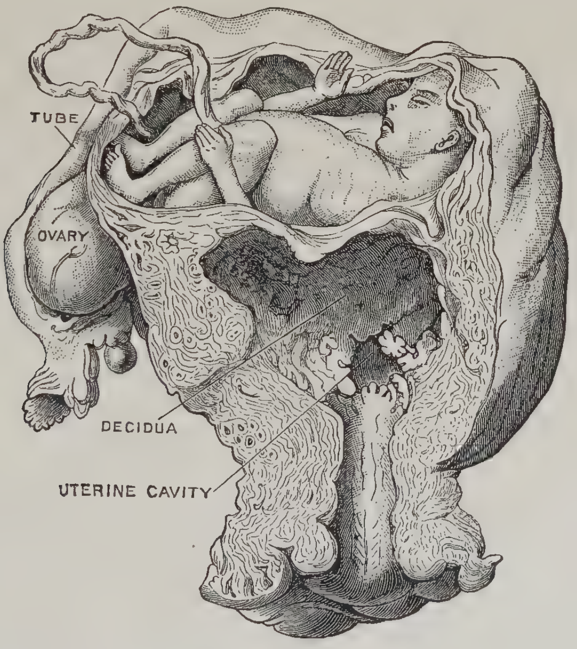
Transverse Section of the Pelvis of a Woman, with an Embryo and Placenta of the Fourth Month of Gestation occupying the Right Broad Ligament.

The second result, escape of the fetus with continuance of its life, is of great interest anatomically, as it explains the majority of the cases in which a fetus has been found free among the intestines, and has given rise to the erroneous impression of primary abdominal pregnancy.

We believe that by far the most usual place for the growth of an ectopic fetus escaped from the tube is between the folds of the broad ligament. Webster (*Tubo-peritoneal Ectopic Gestation*) has demonstrated the possibility of such a growth where the fetus gradually escaped from the tube directly into the peritoneal cavity and there developed. This, however, must be only a very rare exception to the rule that *full-term ectopic fetuses are extraperitoneal.*

Tubal Abortion.—By this term is meant an expulsion of the ovum from the fimbriated extremity of the tube at any time before its occlusion. As this occlusion takes place before eight weeks, at the latest, tubal abortion is considered possible only during the first two months. This event is only likely to occur when the ovum is implanted in the outer third of the tube. Our knowledge of tubal abortion enables us to understand many cases of effusion of blood into the peritoneal cavity in which we find at operation or autopsy a tube empty, but with a collapsed appearance, as though it had been previously distended; and the true nature of the case is often placed beyond doubt by finding among the blood-clots either a fetus, fetal membranes, or a firmly-clotted mass, in the interior of which microscopical examination discloses chorionic villi.

FIG. 318.



Tubo-uterine Pregnancy.

Tubo-uterine or Interstitial Pregnancy.—This variety of ectopic gestation includes those cases in which the impregnated ovum is lodged and develops in that portion of the tube which is embraced by the uterine wall.

In its life-history this condition differs from the other varieties of ectopic gestation in the following particulars:

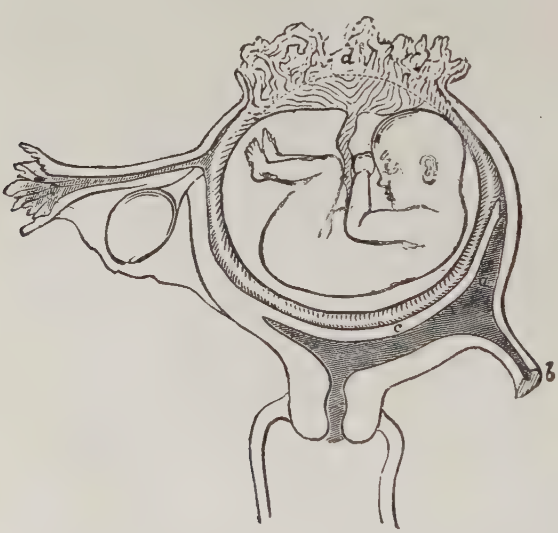
(*a*). Period of growth before rupture;

(*b*). Direction of rupture.

Situated as it is within the substance of the uterine wall, rupture of the sac would not be expected to occur at as early a period as in the varieties called tubal proper and tubo-ovarian, and this is borne out in the histories of reported cases. The wall of the gestation-sac, instead of rapidly thinning, as occurs when the ovum is lodged elsewhere in the tube, markedly thickens, resembling the uterine wall in normal pregnancy, and rupture frequently does not occur until the end of the fourth month.

Direction of Rupture.—An interstitial pregnancy may rupture in either one of two directions: 1. Into the abdominal cavity. (See Fig. 319.) In this case the hemorrhage, without operative interference, is profuse and rapidly fatal on account of the thickness and vascularity of the wall.

FIG. 319.

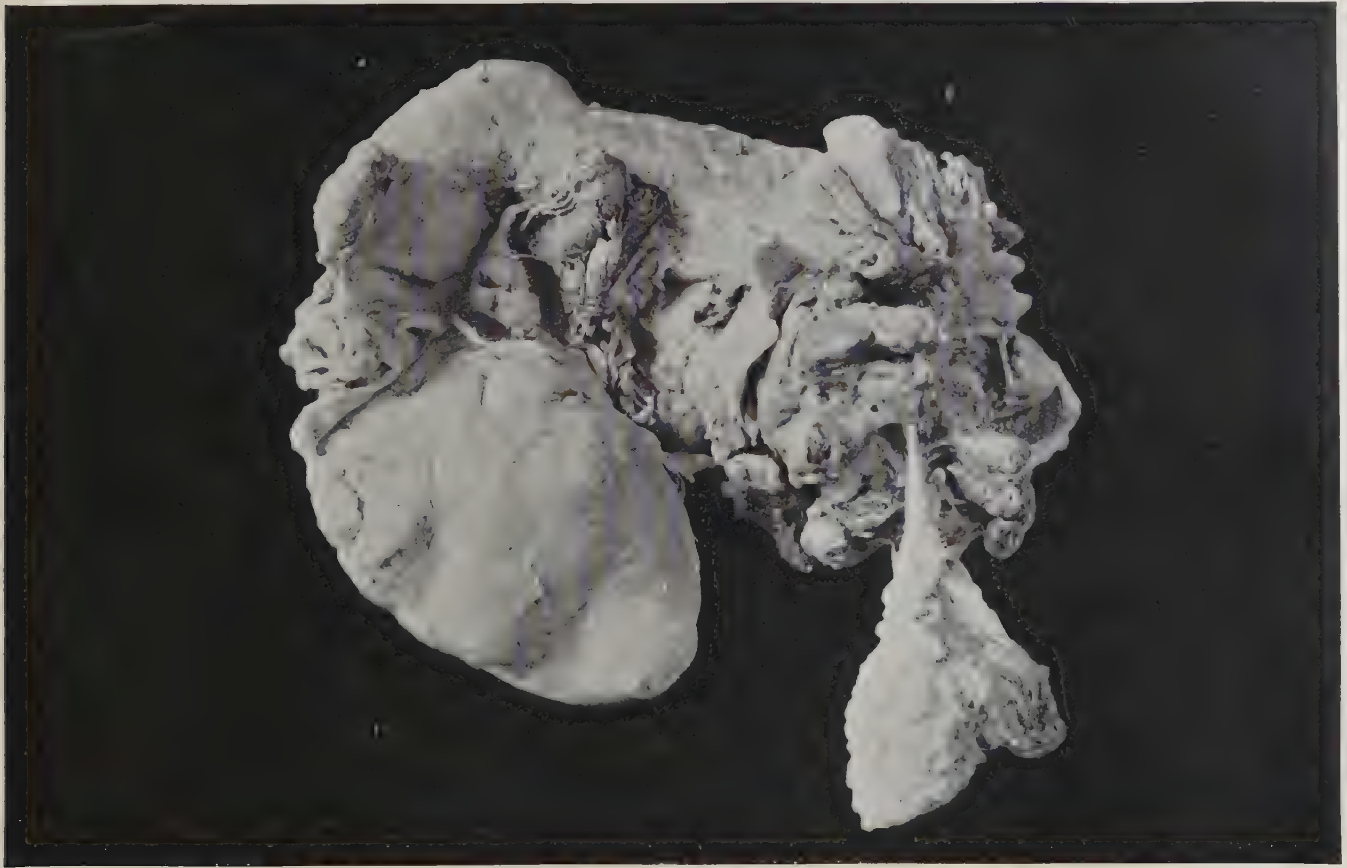


Diagrammatic Representation of Interstitial Tubal Pregnancy at the Time of Rupture.

2. Into the cavity of the uterus. Such an event is considered possible, but, as it would be almost impossible to positively diagnose the condition from normal intra-uterine pregnancy, this direction of rupture we must regard as still *sub judice.*

Cases of interstitial pregnancy are, as a rule, only diagnosed during life at operation necessitated by an intra-peritoneal hemor-

PLATE XXXIII.

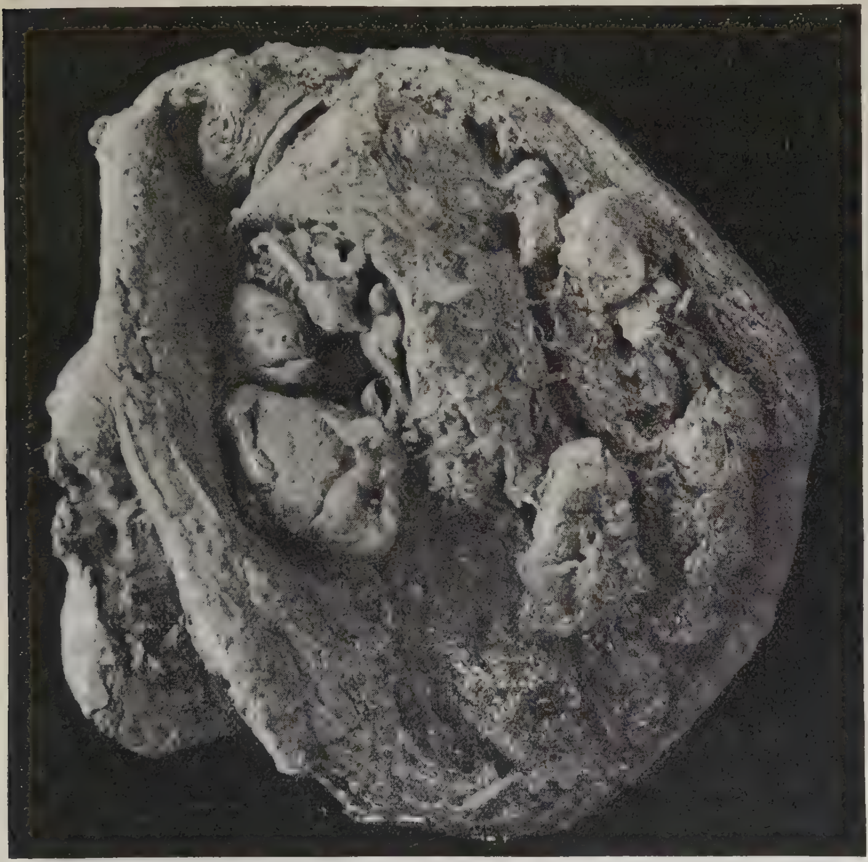


Tubal Abortion : membranes protruding from the fimbriated extremity of the Fallopian tube.

rhage, the pregnancy up to the time of rupture being considered normal.

Period of Tubal Rupture.—When the ectopic gestation is either of the tubal proper or tubo-ovarian variety, the rupture occurs some time between the third and the twelfth week, most often near the eighth. In the interstitial variety rupture may occur at any time between the third and the twentieth week, most often in the fourth month. In tubal abortion, as previously stated, the ovum may escape from the tube at any time prior to the occlusion of the fimbriated extremity which occurs at the eighth week.

FIG. 320.



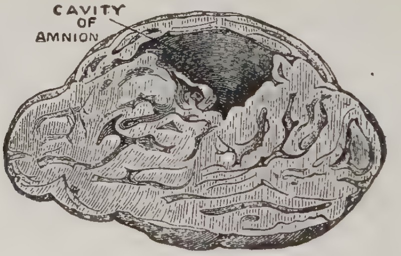
Pregnant Fallopian Tube laid open, showing the fetus killed by hemorrhage into its membranes, but without the escape of the fetus from the tube.

The isthmus of the tube, that straight narrow portion just outside the uterus, seems little adapted to distension with the growth of the ovum, and in our experience rupture of the gestation-sac has occurred at an earlier period here than when situated in the ampulla of the tube. In a general way, then, we might say that an early escape from the tube is more likely to mean rupture of a sac situated in the isthmus, or a tubal abortion, than a rupture of the ampulla.

Changes in the Ovum.—Notwithstanding the implantation of the ovum upon foreign soil, the fetal portions of the placenta are developed much as they would be in the cavity of the uterus; it is only the maternal portion which is lacking, but this causes insecure attachment of the chorion, and, as the fetus develops, a rupture of some of the tubo-chorionic vessels easily occurs. This usually causes the death of the fetus, with or without its escape from the tube.

So long as fetal life continues the growth and development of the ovum seem fairly normal. When death of the fetus occurs early, however, with hemorrhage into its membranes, a condition is formed so resembling a uterine mole that it has been called "tubal mole" or "apoplectic ovum."

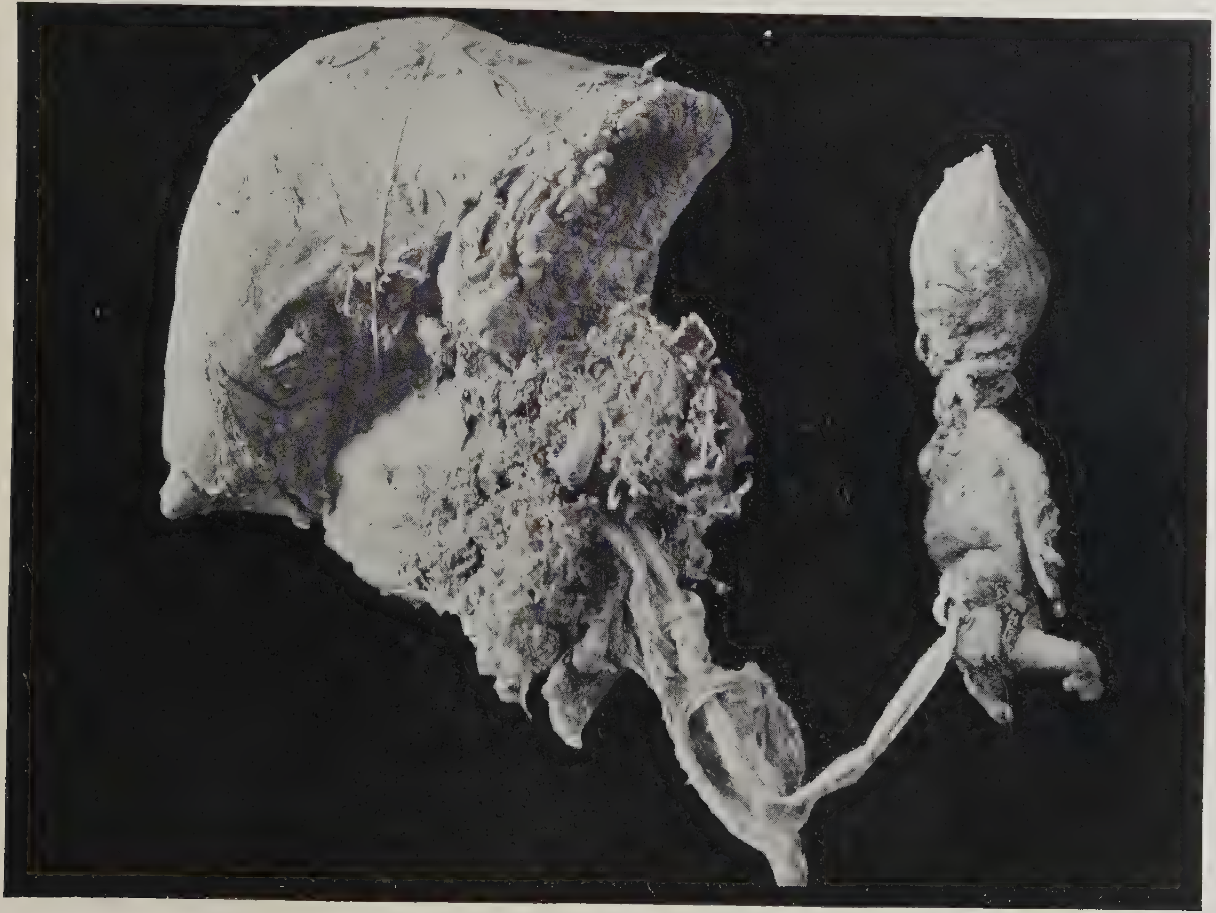
FIG. 321.



Apoplectic Ovum, or Tubal Mole (natural size).

The hemorrhage separates the ovum from the tubal wall, coagulates in the meshes of the chorion, causes contraction of the fetal sac by compression, and forms a mass resembling a dark-red blood-clot. This may be found in the tube, or, if the hemorrhage causes the death of the ovum at the same time it causes tubal rupture or abortion, the tubal mole may be found among a mass of blood-clots, either in the peritoneal cavity or between the folds of the broad ligament. This tubal mole may at first be mistaken for a simple blood-clot, but on section one can often find an amniotic cavity, as in Fig. 321, with or without a fetus; or, if neither amnion nor fetus is discernible, a microscopic section will usually disclose chorionic villi.

PLATE XXXIV.



Tubal Abortion : placenta and fetus protruding from the fimbriated extremity of the Fallopian tube.

As previously stated, the death of the fetus usually occurs at the time of its expulsion from the tube. Rarely, however, fetal life continues, and may even reach full term. After its expulsion from the tube the following changes may take place in the ovum or fetus:

1. When the death of the ovum occurs early, forming a tubal mole, this may be absorbed by the tissues in which it is lodged, be it peritoneum or connective tissue. Rarely suppuration in it may occur, perhaps from the proximity of the rectum.

2. When death of the fetus occurs after it has reached a considerable degree of development and its bony framework is well formed, it may for a long time remain quiescent, the liquor amnii being gradually absorbed. Subsequently it may mummify from absorption of the fluids of the fecal tissues; it may calcify, forming a lithopedion, may be changed into adipocere, or the soft parts may suppurate and the fetal débris be discharged into the rectum, vagina, bladder, or through the abdominal wall.

Symptoms.—The symptoms of a patient afflicted with ectopic gestation are of great importance, for by these symptoms, coupled with a careful study of the history of the patient, the diagnosis is usually made.

In almost every case there has been some departure from the normal menstruation. Usually the patient has gone over her monthly period for a longer or shorter time, it may be only a few days or may be several weeks. Occasionally, however, no period has been skipped, but there has been some change in the character of the last menstruation; usually a lessening in amount. Not infrequently, instead of the menstruation coming on in the usual way, there is at first only a splash, just enough to stain the clothes, then an irregular dribbling, followed by a more or less irregular, continuous brownish discharge containing débris. The early symptoms of pregnancy are often present, such as morning nausea, sensitive breasts, etc. The patient often believes herself pregnant, and this is of assistance in diagnosis.

The next symptom which may surprise the patient is a sudden attack of very severe, sharp pain on one side of the abdomen: this pain is usually excruciating, causing the patient to feel faint, grow pale, and perhaps lose consciousness; she is often covered with cold perspiration; she not infrequently vomits; the pulse becomes rapid and the temperature subnormal. Usually about this time the metrorrhagia appears, and may continue several weeks, being due to the separation of the uterine decidua. As shreds are usually passed from the uterus, the patient often believes she has had a miscarriage and that her troubles will soon be at an end. Following this attack of pain, symptoms of pelvic peritonitis often present themselves. They may subside and the patient be up and around, when she is suddenly seized with another attack of sharp pain, syncope, etc., perhaps even worse than the preceding.

Careful inquiry into the history of these cases often elicits the fact that the patients have been sterile for a longer or shorter period; to this, however, there are many exceptions. To recapitulate, we would call attention to the following symptoms:

(*a*) Amenorrhea;
(*b*) Symptoms of pregnancy;
(*c*) Sudden sharp pain with syncope;
(*d*) Metrorrhagia;
(*e*) Often a history of previous sterility.

PHYSICAL SIGNS.—If examined prior to rupture, one simply feels a distended tube, perhaps a little more boggy and vascular than a hydro- or pyosalpinx of a corresponding size. There is the same elongated, sausage-shaped mass, extending from the cornu of the uterus laterally or downward and backward, which one feels in a salpingitis. The uterus is enlarged; the cervix is soft and patulous.

If seen at the time of, or soon after, a primary intra-peritoneal rupture, the physical signs are often very meagre. There is usually no distinct tumor, and one can only get the sensation of fluid blood or an indistinct doughy feel in the pelvis and the constitutional symptoms of internal hemorrhage.

When the rupture has occurred between the folds of the broad ligament, one gets all the physical signs of a pelvic hematoma.

Let us now digress a little and consider the conditions *pelvic hematocele* and *pelvic hematoma.* By pelvic hematocele we mean an effusion of blood into the peritoneal cavity. This would naturally gravitate into the pouch of Douglas should this not be obliterated, or, if profuse, the blood may rarely flow over into the utero-vesical pouch as well. Coagulation, although longer delayed than in blood effused into connective tissue, finally occurs, and the blood-mass is roofed in by peritonitic exudate binding together adjacent structures—coils of intestine, omentum, and uterus.

Etiology.—Concerning the etiology of pelvic hematocele our ideas have changed greatly within the past few years. While formerly the text-books contained long lists of causes of this condition, operative experience has taught us that in nearly all cases we can assign but one cause—viz. ectopic gestation; and, as the source of the blood, the tube, either from rupture or from tubal abortion. To this general rule we admit exceptions. We know that after the enucleation of diseased tubes and ovaries, or tumors of the same, an oozing surface is left which often gives rise to quite a large effusion of blood; here, however, the cause is plain, and would not produce confusion. We also admit the possibility, from a slight traumatism, of rupture of peritonitic adhesions, some of which are markedly vascular, and would cause a considerable blood-effusion. Other possible causes are rupture of an ovarian hematoma or excessive hemorrhage from the rupture of a Graafian follicle. These events, however, would only rarely occur, and may be considered as exceptions to the general rule stated above. Most of the cases of regurgitation of blood from the tube we believe to be instances of tubal abortion.

Physical Signs.—Previous to the encapsulation of the blood-effusion the physical signs are very few. There is a fulness in the pouch of Douglas which gives to the finger the impression of thick fluid, and from the floating up of the intestines there is usually more or less distension of the abdomen. When the effusion becomes encapsulated by peritonitic adhesions, the mass becomes firmer to the touch, the posterior fornix bulges, and the uterus is pushed forward. As the blood coagulates, the increase in the density of the effusion becomes apparent to the examining finger. The course and prognosis of pelvic hematocele are usually similar to ectopic gestation with intra-peritoneal rupture, and will be discussed later.

By *pelvic hematoma* we mean an effusion of blood into the connective tissue beneath the peritoneum—viz. between the folds of the broad ligament. Here, again, although other causes are probably more common than in a pelvic hematocele, a very common cause is the rupture of an ectopic gestation-sac. The reason for considering other causes more frequent than in hematocele lies in the fact that varix of the broad ligament, due to various causes of venous congestion, is common, and where such is present but a slight traumatism is required to produce a blood-effusion.

Physical Signs.—These differ from those of a pelvic hematocele.

While in the latter there is at first no limiting membrane, in the former the effusion is clearly limited by the folds of peritoneum forming the broad ligament, and a distinct tumor is developed. This tumor bulges down on one side of, and behind, the cervix, pushes the uterus forward and to the opposite side, and can be felt above Poupart's ligament when it has lifted the peritoneum from the pelvis. It seems to occupy all the space between the uterus and the sides of the pelvis, and if the finger is inserted into the rectum, the effusion, especially if situated on the left side, is found to have surrounded it, thus producing a stricture. This is due to the ring formed by the attachment of the peritoneum to the second portion of the rectum.

Concerning the changes in a pelvic hematoma, two are possible:

1. Absorption. This is possible even when the tumor is of quite a considerable size;

2. Suppuration. This seems frequently due to the proximity of the rectum, or if the hematoma is due to a ruptured tube, infection may come from the uterus through the stump of the lacerated tube. The suppurating hematoma may rupture into the rectum, vagina, bladder, or rarely above the pelvic brim.

DIAGNOSIS OF ECTOPIC GESTATION.—For a clearer discussion, this may be divided into two periods:

1. Prior to tubal rupture or abortion;
2. Subsequent to tubal rupture or abortion.

Few opportunities are presented for diagnosing ectopic gestation during the ante-rupture period. Unfortunately for the diagnosis, the patients during this period are apt to suffer but little. A large proportion of the cases have absolutely no symptoms leading them to suspect an abnormal condition. Occasionally, however, perhaps from surprise at the symptoms of pregnancy after a long period of sterility, or in their first pregnancy, in order to determine if that condition really exists, or from pain in one inguinal region, they present themselves to the physician, and under these circumstances the diagnosis has been made a number of times and its correctness verified by subsequent operation.

To enable one to make a diagnosis of ectopic gestation prior to rupture we would emphasize two rules, which we consider of great importance:

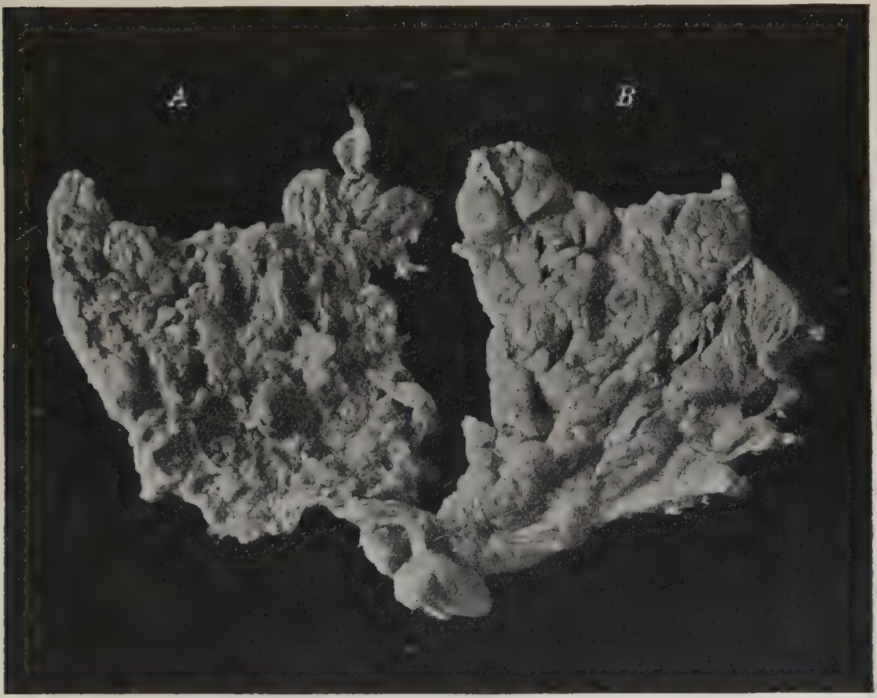
1. Whenever a pregnant woman presents herself with a mass at

the side of or behind the uterus, always think of the possibility of ectopic gestation.

2. Whenever any irregular symptoms of pregnancy occur the menstrual history should always be carefully inquired into, noting any change in its character, the exact duration in days, and its relative amount during each of the months which are open to suspicion.

The reason that so many more diagnoses of ectopic gestation are now made than formerly, and made correctly, lies in the fact that we are now on the watch for that condition. We need frequently to ask ourselves: Can this be ectopic gestation? And this is especially imperative when we meet with the early symptoms of pregnancy—nausea, sensitive breasts, softened cervix, etc., with a distended tube at the side of the uterus. This may be a hydro- or pyosalpinx simply coexisting with pregnancy. On the other hand, however, its boggy feel, a rather marked vascularity, and a careful observance of the second rule stated above concerning menstrual history may lead us to make a probable, if not a positive, diagnosis of ectopic gestation.

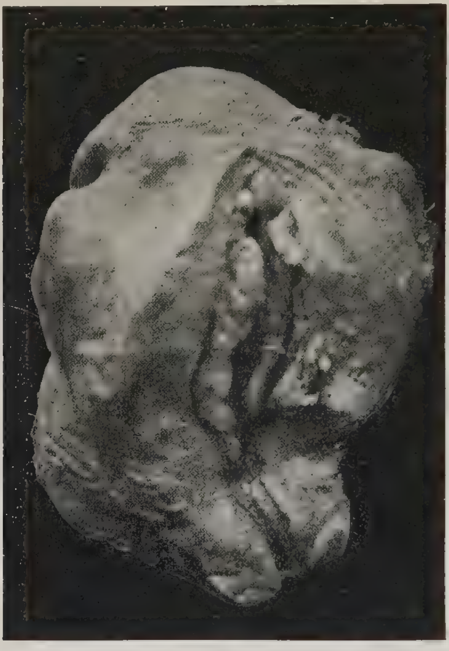
FIG. 322.



Decidua expelled from the Uterus in a case of Ectopic Gestation: *A*, rotated, so as to show the shaggy uterine side; *B* shows the free surface.

Another factor in the diagnosis of this condition is the expulsion of the uterine decidua. While the ovum is developing in the tube there is forming in the uterus a decidua resembling that of a normal pregnancy, but differing from it in having a smooth, inner surface, unbroken by the attachment of the ovum; in other words, having no decidua reflexa or serotina; it is all decidua vera. This decidua, usually at or near the time of tubal rupture or abortion, is discharged from the uterus, sometimes entire, sometimes in small particles or shreds. It is a membrane varying from an eighth to a quarter of an inch in thickness, shaggy on the surface which is attached to the uterine wall, smooth, but presenting numerous fine wrinkles, on the inner free surface. On microscopical section it presents the appearance shown in the accompanying cut. When passed entire it forms a triangular sac, containing three openings, one corresponding to each Fallopian tube and one to the internal os. With the separation and discharge of this decidua there occurs a metrorrhagia which may continue for several weeks. The passage of these shreds with the subsequent metrorrhagia is often a source of error both to the patient and her physician, and a miscarriage is a frequent erroneous diagnosis.

Fig. 323.



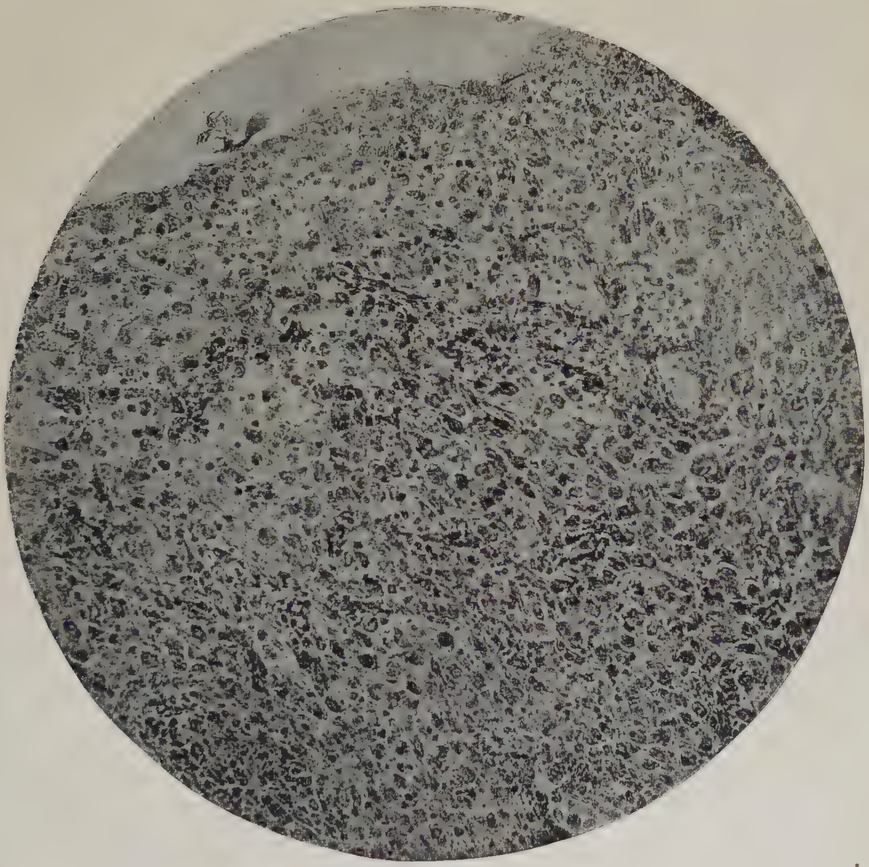
Decidua in Situ: fibroid uterus removed at time of operation for ruptured ectopic gestation.

There are two conditions from which the decidua from a case of ectopic gestation must be differentiated:

1. The decidua of an intra-uterine pregnancy;
2. The membrane of a membranous dysmenorrhea.

The decidua in an early miscarriage may resemble in places that of an ectopic gestation, but in the former there is found evidence of implantation of the chorion, villi, etc. which is wanting in the latter.

FIG. 324.



Photomicrograph of a Section of Decidua in a Case of Ectopic Gestation, showing the large decidual cells.

The condition called membranous dysmenorrhea is surrounded with much confusion. It is perfectly possible, in the light of recent experience, that some of the cases described as membranous dysmenorrhea were in reality cases of ectopic gestation. The points on which we would lay the greatest stress in differentiating the dysmenorrhea from the ectopic gestation would be the frequent recurrent character of the former at the time of a menstrual period and the absence of the symptoms of pregnancy. According to Wyder and Ayers, the dysmenorrheal membrane does not contain the large cells seen in Fig. 324.

The diagnosis of ectopic gestation has occasionally been made by curetting a uterus for supposed retained secundines, under the impression that the patient had had a miscarriage, and finding the uterus empty save for the decidua, which showed no chorionic villi.

Diagnosis at the Time of, and Subsequent to, Tubal Rupture or Abortion.—This is usually not difficult if a careful history is obtained, and this is considered in conjunction with the present condition of the patient. If seen at the time of tubal rupture or abortion, we find, coupled with the history of the patient during the ante-rupture period, the symptoms of sudden shock and internal hemorrhage. The patient is suddenly seized with a sharp, excruciating pain, usually on one side of the abdomen. She feels faint, grows pale, perhaps loses consciousness; the surface of the body is often covered with cold perspiration; the pulse is rapid and feeble; the temperature is often subnormal. These symptoms, especially if there has been a period of amenorrhea, should always suggest a ruptured ectopic gestation-sac. If the patient survives this primary rupture—and she frequently does—the symptoms abate, only to be repeated at almost any instant, with or without a fatal result.

If seen subsequent to the time of tubal rupture or abortion, we have, in addition to the history of early pregnancy, with one or more attacks of sharp pain and threatened collapse, the physical signs of either a pelvic hematocele or a pelvic hematoma, depending on whether the rupture was intra- or extra-peritoneal.

Differential Diagnosis.—The condition most likely to be confused with an ectopic gestation is probably a tube distended with either serum or pus, especially the latter. The physical signs of the two conditions prior to rupture often closely resemble one another, and, just as the rupture of an ectopic gestation-sac is followed by symptoms of shock and then peritonitis, so may the rupture or leakage of a pus-tube be followed by similar symptoms. The chief point in their differentiation is the difference in their clinical history. Here comes in the necessity for eliciting, if present, the symptoms of a possible early pregnancy. During the ante-rupture period, as already stated, the greater vascularity and boggy feel of a pregnant tube may enable one to differentiate it from a pyosalpinx.

Subsequent to the rupture the symptoms of the two conditions differ more widely:

Ruptured Ectopic Gestation vs.	*Ruptured Pyosalpinx.*
Frequency of pulse greater.	Frequency of pulse less.
Temperature at first subnormal; later rises slightly.	Temperature rises steadily and markedly.
Pain of shorter duration.	Pain of longer duration.
Patient shows loss of blood.	Patient does not show loss of blood.
Septic symptoms not usually present.	Patient soon shows signs of sepsis.

A fibro-myoma is sometimes confused with an ectopic gestation, and instances occur where the differential diagnosis is difficult. The means on which we rely are chiefly the difference in the history of the two cases: In the case of ectopic gestation the short history, first of amenorrhea, then attacks of sudden sharp pain, faintness, and metrorrhagia; in the case of the fibro-myoma a long history of gradually increased menstruation, and perhaps gradually increased pressure-symptoms, without the symptoms of early pregnancy.

In physical signs the fibro-myoma is usually much more intimately connected with the uterus and harder than the ectopic gestation. Both conditions may coexist, as in the case from which the specimen (Fig. 323) was taken.

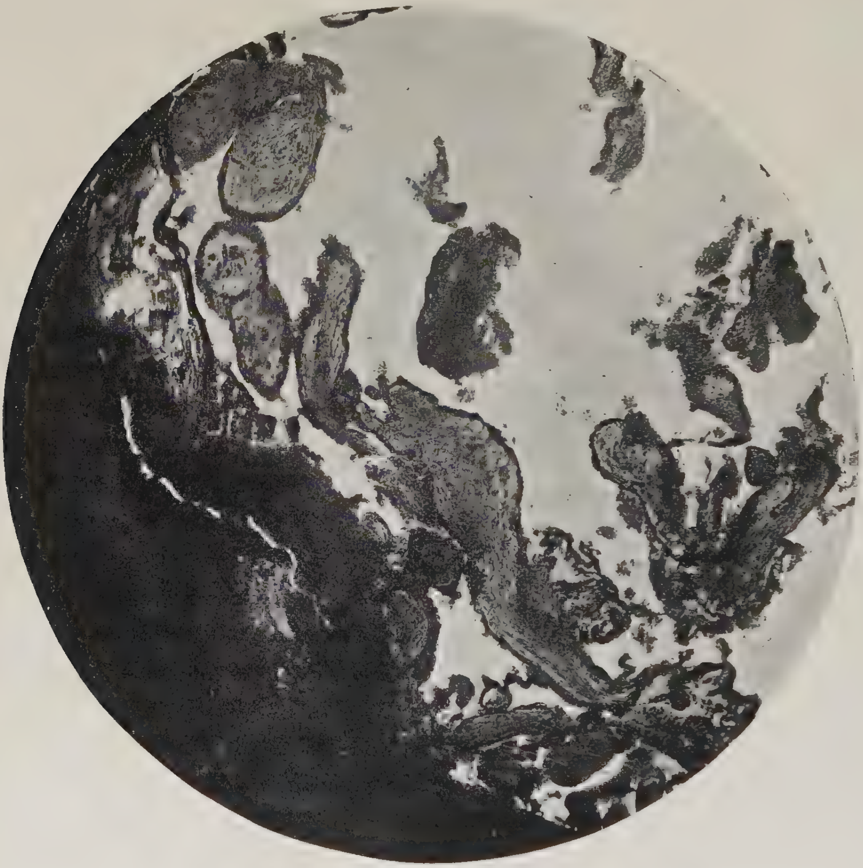
Into the differentiation between pelvic hematocele and pelvic hematoma due to ectopic gestation and those due to other causes, we shall not enter, believing our present knowledge insufficient for the task, and that most cases of pelvic hematocele and hematoma, especially the former, are due to the rupture of an ectopic gestation-sac. We believe, however, that in the present state of our knowledge we should not declare to be due to an ectopic gestation an effusion of blood in the pelvis found at operation or autopsy, unless we find either a fetus or chorionic villi, or unless we have obtained from the uterus a decidua devoid of chorionic villi.

The appearance of the chorionic villi, as seen in section under the high powers of a microscope, is well shown in Fig. 325. The central portion of the villus is seen to be composed of irregular-shaped cells, while the outer wall consists of a single or double row of cubical epithelium. Sometimes several villi may be seen in a single field, but not infrequently a large number of sections have to be cut and examined before a single villus can be found.

The differences in the physical signs of pelvic hematocele and pelvic hematoma have already been given, and we will here only refer to them.

Tumors of the ovary are sometimes confused with ectopic gestation, but a careful study of the menstrual history and a search for the physical signs of pregnancy will usually enable one to arrive at a correct diagnosis. Mistakes, however, in diagnosing ectopic gestation are bound to occur, even with the most careful, from the fact that the condition is sometimes found at operation, when not a period has been missed and not a symptom of pregnancy has been presented.

Fig. 325.



Photomicrograph of Chorionic Villi, found in the tube of a case of ectopic gestation.

Treatment.—In considering this division of our subject we would recognize two periods, requiring separate discussion:

1. Prior to tubal rupture or abortion;
2. Subsequent to rupture:
    - (*a*) Intraperitoneal.
    - (*b*) Extraperitoneal.

When the diagnosis of an ectopic gestation is made prior to the rupture of the tube, the question which must present itself to every conscientious gynecologist is: How can we best subserve the interests of our patient? The advocates of electricity claim that by the current, either galvanic or faradic, the fetus is killed and the products of conception are absorbed. Admitting this as a possibility, we still believe that we are not consulting the best interests of our patient by so doing.

In spite of the unfortunate case of Matthews Duncan, referred to in nearly every work on this subject, in which high currents, both galvanic and faradic, were used without killing the fetus, we believe that in the majority of cases, when seen early, electricity will kill the fetus, but that the danger to the patient disappears with the life of the fetus we cannot believe. Even after the death of the fetus, hemorrhage into the tube sufficient to cause its rupture or tubal abortion, although it may not occur in every case, is still far from improbable.

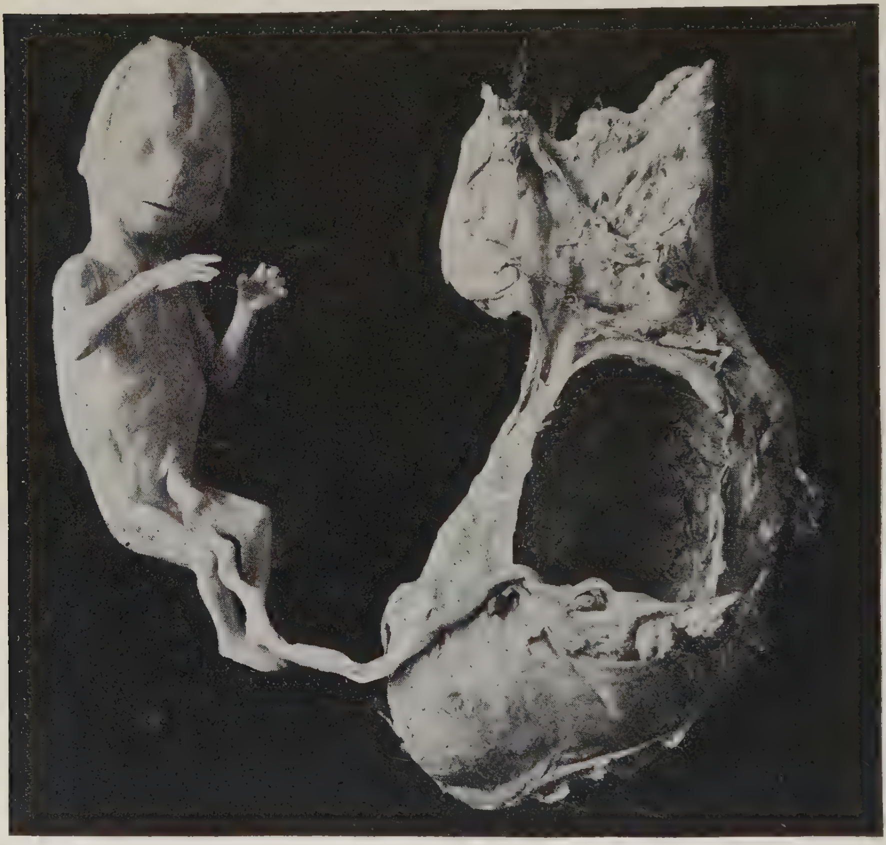
Further than this, while waiting for a cure by electricity or in the manipulation incident to its application, tubal rupture or abortion, with fatal hemorrhage, may occur before the surgeon has time to open the abdomen and remove the sac. A forcible illustration of this was the case illustrated by Fig. 323. The patient was moved from the bed to the table for the application of electricity. In so doing the tube ruptured, and before preparations could be made and the abdomen opened the patient was moribund from internal hemorrhage.

Even if the fetus and membranes are absorbed under the use of electricity, a damaged tube is left, which is very likely to prove a source of future trouble.

For these reasons we claim that electricity is not a satisfactory method of treating this condition. Galvano-puncture of the sac is dangerous, and ought never to be used. We believe that the method which gives the best promise of deliverance, not only from present danger, but from future trouble, is cœliotomy, with removal of the pregnant tube.

We admit the possibility of a tubal rupture or abortion with only a slight hemorrhage, the absorption of the effusion, and the recovery of the patient. This is a possibility, but no one can tell when this is to be the result, or when a rupture is to occur with hemorrhage so profuse as to be fatal within a few hours without operative interference. From the time an impregnation occurs in a Fallopian tube until the tube is removed, that patient is never free from danger.

Fig. 326.



Tubal Rupture in Case of Ectopic Gestation.

Moreover, during the period prior to the rupture of the tube the operation for the removal of the gestation-sac is one of the simpiest in abdominal surgery, and in the hands of a skilled operator should have a mortality nearly *nil.*

Let us next consider the treatment at the time of, and subsequent to, tubal rupture or abortion. Here, again, we must consider two classes of cases depending on whether the rupture is *intraperitoneal* or *extraperitoneal.* If *intraperitoneal* rupture has occurred, most electro-therapeutists agree that the time for their method of treatment has passed, and it is the consensus of opinion that there is now but one proper treatment—viz. cœliotomy and removal of the lacerated tubal sac. We do not mean to say that every case is fatal at its first hemorrhage. Many cases prove the contrary, and in the hands of careful observers it may be good practice, *if the patient is improving in pulse*, to wait till she has rallied from the shock of the initial hemorrhage before operating. The safest rule, however, is to *prepare at once* for operation.

Just a word as to the method of procedure. Strict asepsis is a matter of great importance. The gestation-products and the effused blood at the time of or soon after rupture may be considered aseptic; at the same time, they form a medium very easy to infect, and in an emergency operation, such as this in private practice often is, preparations in order to be rigidly carried out must be simple in detail. Fortunately, in heat we have an agent which will place our instruments and dressings above suspicion of infection. While arranging other details about the operation the instruments may be boiled in a soda solution (1 per cent. solution of washing soda), and at the same time water may be boiled for irrigation, if needed. In this way instruments may be prepared in about twenty minutes.

During the preparation of the instruments the skin of the patient needs attention in order to avoid stitch-hole infection. Probably the best plan is to leave a towel soaked in a soft-soap solution on the abdomen, while the instruments are being sterilized. The abdomen is to be thoroughly scrubbed with soap and water, washed with alcohol, and then with bichloride (1 : 1000) before the initial incision.

On making the incision in the median line down to the peritoneum the latter is often found tense and dark, and at the first nick of the peritoneum fluid blood may well up in great abundance. No attention must now be paid to the blood already in the peritoneal cavity, but the source of the hemorrhage, the lacerated tubal sac, is to be seized at once, ligated and removed. The manipulations necessary for the removal are the same as those described in the article on Pelvic Inflammation. The same structures are dealt with, and, as a rule, the tubal pregnancy is complicated by adhesions, just as is the case in pus-tubes. We now have time to remove the blood-clots and products of conception, which are probably free in the abdominal cavity. Large clots and masses are removed by the hand; the remainder may either be floated out with the irrigating fluid, boiled water (preferably containing a half-teaspoonful of common salt to the pint), or, what is often sufficient, the blood may be simply removed by sponging. Too much time must not be spent in attempting to remove every blood-clot. Let the pelvis be sponged and the abdomen closed. Drainage, as a rule, is necessary.

If the patient has lost a large amount of blood and the pulse is very feeble, some of the irrigating saline fluid may with advantage be left in the abdomen; also a saline enema containing stimulants may be administered. The question of infusion may have to be decided.

Extraperitoneal Rupture.—If this event has occurred, as determined by the physical signs given under Pelvic Hematoma—viz. the circumscribed tumor, the lateral fixed position, stricture of the rectum, etc.—the treatment is usually *non-operative.* The patient should be kept quiet. For the first few hours cold applications are of value; later, heat, both externally in the form of poultices and *per vaginam* by hot-water douches, is required.

In the majority of cases the pelvic hematoma thus formed will gradually be absorbed. There are, however, three possible indications for a future operation:

1. If the hematoma suppurates;
2. If repeated hemorrhages occur into the sac;
3. If fetal life continues.

Occasionally, through infection from the rectum or from the uterus through the stump of the lacerated tube, suppuration of the hematoma occurs: it is then to be incised through the vagina, washed out, and thoroughly drained. If repeated hemorrhages are added to this hematoma, two courses are open, according to the size of the tumor. If comparatively small and situated low in the pelvis, it may be incised through the vagina, the clots and débris removed, and the cavity drained. If large and extending high in the pelvis, cœliotomy is probably the better operation. The broad ligament is incised and the blood-clots and products of conception are removed. If the contents of the sac appear aseptic, the sac may be sponged out and then closed.

If for any reason the contents of the sac seem open to the suspicion of sepsis, the sac had better be stitched to the lower portion of the abdominal wound and drained.

Fetal Life Continuing.—In the rare condition where fetal life survives the tubal rupture, new problems present themselves. We have seen above that in almost all cases this only happens when the rupture is extra-peritoneal, between the folds of the broad ligament. From the time of tubal rupture till the presence of a live fetus is thoroughly demonstrated, the patient is subject to the same rules of treatment as have been previously outlined. Subsequent to this event two lives have to be considered, and the life of the mother seems to be but little endangered by allowing the fetus to arrive at full term. Having arrived at a diagnosis, then, of a living ectopic fetus, the patient should be placed under close observation until the full period of fetal development. To wait, however, until pseudo-labor has passed and the child is dead is neither scientific nor surgical. Having prepared for operation, an incision is made well to one side of the median line, so as carefully to avoid opening the peritoneal cavity; the fetal sac is incised and the fetus is extracted. The chief point at issue in the whole treatment of a living ectopic fetus now presents itself: How shall we deal with the placenta? To strip it off from the tissues to which it is attached would usually mean terrific hemorrhage, and probably death of the patient. The best plan seems to be to stitch the fetal sac into the abdominal wound, thoroughly cleanse the sac, and pack it with gauze; then to keep it clean and drained until the placenta comes away. Lawson Tait has recommended cutting the cord close to the placenta, washing out the sac, closing it hermetically, and leaving the placenta to be absorbed. This method of treatment, however, has not met with general acceptance.

Occasionally the fetus will be found to have been dead for some time and the placenta loose. In this case of course they are both to be removed at the time of operation.

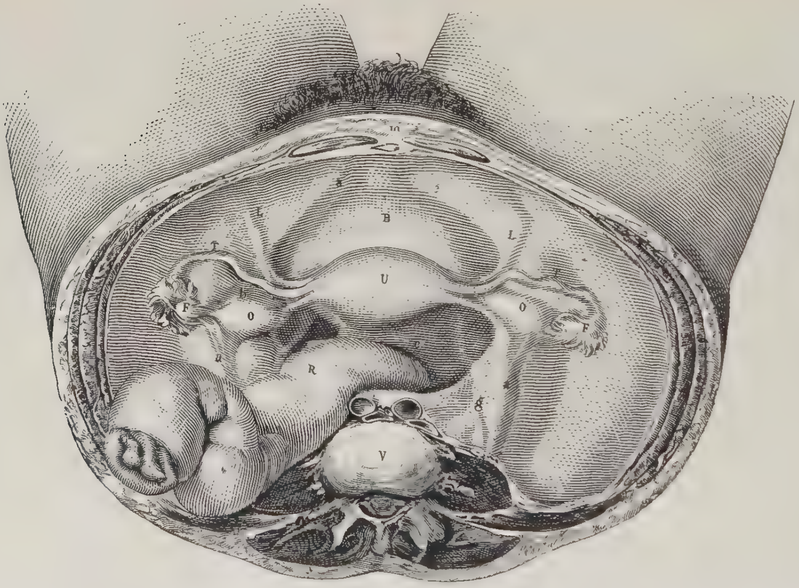
There is one other condition the treatment of which requires consideration—viz. interstitial pregnancy with intraperitoneal rupture. Although rare, this condition needs prompt surgical interference if the patient is to be saved. The treatment is abdominal hysterectomy, and, as the element of time is all-important, the extra-peritoneal treatment of the stump is probably the method of election.

DISEASES OF THE OVARIES AND TUBES.

Anatomy and Physiology of the Ovary.

The ovaries in the human female are situated, one on each side of the uterus at the level of the brim of the true pelvis, in the posterior fold or leaflet of the broad ligament. The other two leaflets of the ligament are formed superiorly by the Fallopian tube and anteriorly by the round ligament. When the woman is in the erect position and the uterus in its normal situation, the ovary lies upon the ligament and looks upward and backward. The ovary is about an inch and a quarter long, three-quarters of an inch in width, and half an inch thick, convex upon the posterior and flattened upon the anterior surface, resembling in shape and size an almond; the external extremity is blunt and rounded, the internal pointed, pro-

Fig. 327.



Horizontal Section of the Abdomen immediately above the Crests of the Ilii: *B*, fundus of bladder; *U*, uterine body; *O*, ovary; *L*, round ligament; *T*, Fallopian tube; *V*, sacrum; *R*, rectum; *C*, utero-sacral ligaments; *g*, ureter.

jecting toward the ovarian ligament. It is connected with the uterus by the latter ligament, which is about one inch long.

The normal ovary weighs from ninety to one hundred and thirty-five grains. It is but partially covered by peritoneum, as is demonstrated by the contrast between the columnar epithelium of its posterior surface and the pavement epithelium of the peritoneum. The ovary consists of an external cortical portion, composed of cellular elements, and an internal medullary or fibrous portion, through which the blood-vessels, lymphatics, and nerves are distributed. The blood-vessels and nerves enter through the lower portion, which is called the hilum.

At the fourth month of intra-uterine life the germinal epithelium and the stroma undergo a process of adhesion, by which masses of epithelium are aggregated in the stroma, forming tubes. Some of these tubes possess outlets to the surface of the organ. Some cells in the tubes early attain to considerable size, have a nucleus, and form the ova. The ova become isolated, and by further proliferation of cells acquire a receptacle—the Graafian follicle. The germinal epithelium is divided by vascular stroma into two layers—an outer, composed of thin columnar cells, with one or two rows of round cells, which contain primitive ova, and an inner, thicker stroma between two layers of cells, which subsequently forms the tunica albuginea.

The ovum originally consists of a nucleus and nucleolus, with a small amount of protoplasm. It is never situated in the centre of the follicle, but occupies the side most distant from the surface of the ovary. The number of ova in an ovary have been estimated as numbering from 36,000 to 400,000. It is evident that Nature has made provision for the loss of a large number in a rudimentary form.

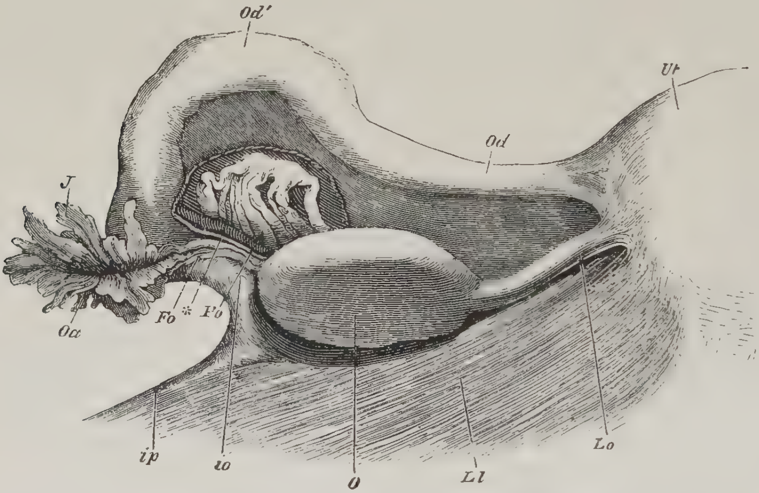
The formation of ova and egg-balls terminates with fetal life, but the isolation of the ova and transformation of egg-balls into follicles may be continued a couple of years later.

The blood-vessels of the ovary are derived from the ovarian artery, analogous to the spermatic in the male, which comes off from the aorta. It anastomoses with the uterine, a branch of the internal iliac artery.

The right ovarian vein enters the inferior vena cava at an acute angle and is supplied with a valve. The left enters the left renal vein at an angle and is without a valve. To this anatomical fact is attributed the greater relative frequency of disease of the left ovary. The nerves enter the hilum as two fine twigs from the ovarian plexus.

Puberty.—At birth the ovary is flattened and elongated. As puberty approaches it assumes an olive shape, which indicates the sexually mature female. This period is characterized by the advent of the intermittent discharge known as menstruation, supposed to be synchronous with ovulation. That these processes are not necessarily interdependent is evident from the fact that women become pregnant before the first occurrence of the menses, and, indeed, some have given birth to several children without ever having menstruated. Numerous cases are upon record where women have become pregnant after the occurrence of the menopause.

FIG. 328.



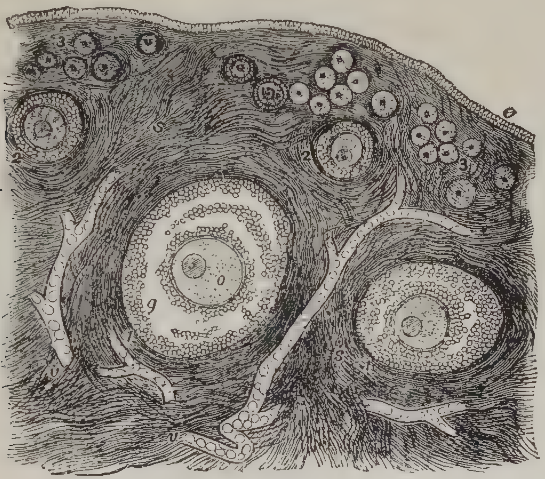
Ut, uterus; *O*, ovary; *Oa*, infundibulum and abdominal aperture of the Fallopian tube and fimbriæ; *Fo*, fimbria attached to the ovary; *Po*, parovarium; *io*, marginal fold of broad ligament continued on to the infundibulum (infundibular ovarian ligament); *ip*, the same fold connecting the former with the pelvis; *Od*, isthmus of the Fallopian tube; *Od'*, ampulla; *, fimbrio-ovaric groove, lined by mucous membrane covered by ciliated epithelium; *Ll*, muscular striæ under posterior layer of broad ligment; *Lo*, muscular utero-ovarian ligament.

Puberty generally takes place between the thirteenth and fifteenth years. A well-established corpus luteum has been found in the ovary of a child which died at nine years.

While it is indisputable that ovulation may occur without menstruation, it is to be doubted, notwithstanding the views of Tait, whether menstruation ever takes place in the absence of both of the ovaries. The cases in which menstruation has continued after the ovaries were removed are those in which a portion of the ovarian stroma was overlooked where it extended downward upon the ovarian ligament, or accessory ovaries were present, or there were tufts of ovarian stroma spread over the adjacent pelvic peritoneum.

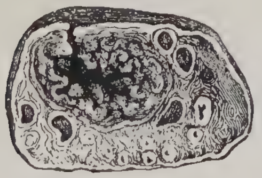
The mature human ovum measures $\frac{1}{120}$ of an inch in diameter. It is provided with a germinal vesicle which has a diameter of $\frac{1}{300}$ of an inch, and within it a germinal spot whose diameter is $\frac{1}{3000}$ of an inch. As the ovum matures it moves from the centre to the periphery of the follicle; induced by the secretion of liquor folliculi contained in its discus proligerus, it is impelled against the thinned wall. This wall consists of two layers—an outer, the stroma of the ovary, and an inner, the follicular epithelium. The ovisac is most vascular at the point of rupture, and as the ovum escapes into the peritoneum or oviduct the ruptured vessels bleed and fill up the space with a clot. This clot, as it contracts, becomes known as the corpus luteum. If fecundation of the ovum has occurred, the act

FIG. 329.



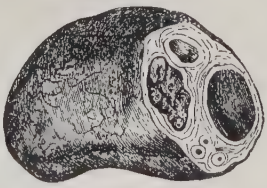
Section of Ovary.

FIG. 330.



Typical Corpus Luteum, fifteenth day from the beginning of menstruation.

FIG. 331.



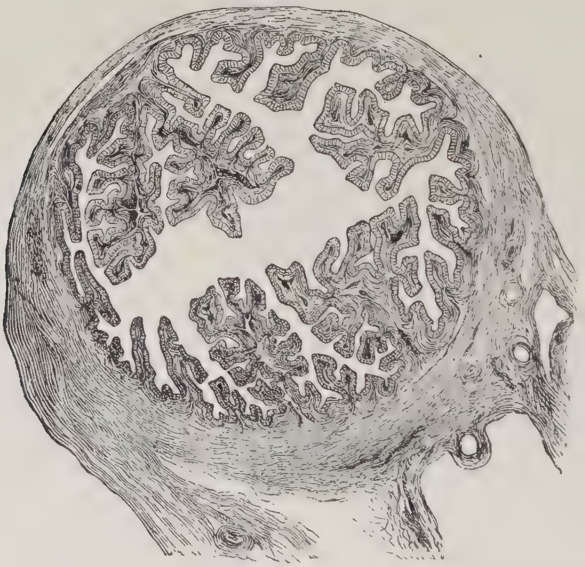
Freshly ruptured Follicle, twenty days after the beginning of the last menstruation.

of conception leads to greater vascularity and the formation of a large clot, designated the true corpus luteum to distinguish it from the false or small, less durable formation of ordinary unfecundated ovulation.

The true corpus luteum is largest about the eleventh week, and continues to the end of pregnancy. The false rapidly becomes smaller and presents a bright and shining centre. The successive rupture of matured follicles leaves cicatrices upon the surface of the ovary.

Fallopian Tube.—Projecting from each side of the fundus of the uterus, just posterior to the round ligament, and occupying the superior fold of the broad ligament, is the Fallopian tube. Its average length is about four inches, and its greatest width is at the outer extremity, called the fimbriated extremity, infundibulum, or morsus diaboli. Its orifice is called the ostium abdominale, and is surrounded by four or five large and eight or ten small fimbriæ, which are continuous with the mucous lining of the tube, and one of which, the fimbria ovarica, extends to the ovary. The narrowest portion of the tube is the inner or uterine end, an inch long, which is known as the isthmus. Its orifice is called the ostium internum. The diameter of the isthmus varies from one-twelfth to one-sixth of an inch, while the diameter of the ampulla, or outer

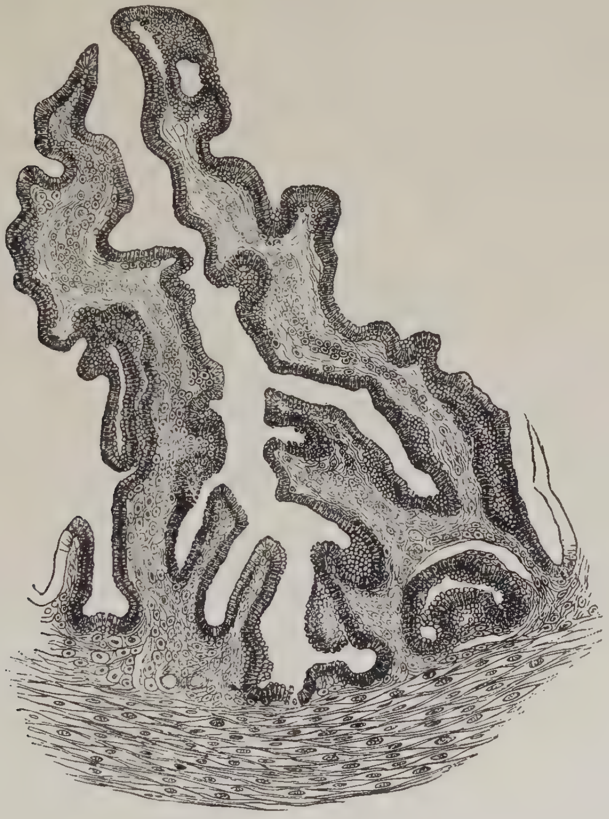
Fig. 332.



Transverse Section of the Fallopian Tube of a Macaque Monkey.

portion of the tube near the ostium, is from one-fourth to one-third of an inch. At its origin the tube is directed upward and backward; the ampulla curves upon itself until the infundibulum or fimbriated extremity is directed toward the ovary. The fimbria ovarica has upon its upper surface a groove bordered by small fringes or fimbriæ. Along this furrow passes the ovum to the oviduct as it escapes from the ovary, doubtless facilitated by the current produced by the wave-like motion of the cilia.

Fig. 333.

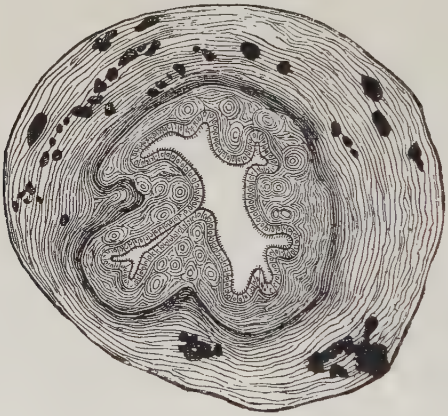


Recess of the Tubal Mucous Membrane of the Panolian Deer.

The Fallopian tube has three coats of layers—the peritoneum, which does not completely encircle it, forming a mesosalpinx; the muscular, consisting of longitudinal and circular fibres; and the internal coat, consisting of the mucous membrane. The latter is thrown into longitudinal furrows and projections. Comparison of Figs. 332, 333 and 334 shows that the arrangement of the folds of the tube is much more complex than it is in the human female. These folds possess the characteristics of glandular structure. The membrane is lined with ciliated columnar epithelium. "The function of the latter," says Tait, "is to expedite the passage of the ovum to the womb, and to limit the opportunity for entrance of the spermatozoa." This theory obligates conception, as a rule, to occur in the uterus, but the repeated occurrence of ectopic gestation, in cases in which careful examination has failed to disclose any abnormal condition of the membrane between the gestation-sac and the uterus, goes far to discredit the theory.

The most important change taking place at puberty is in the structure of the tube. It becomes more vascular, its muscular structure is developed, and the epithelial layer is fully formed. These changes result in the functional movement through which pregnancy is rendered possible. As has already been noted, ovulation has repeatedly occurred prior to puberty, but the ovum has been lost in the peritoneal cavity. Ovulation may continue after the menopause, though the ovaries have become atrophied, but the tubes will then have become straightened, and again fail to carry the ovum to the uterine cavity.

Fig. 334.



Transverse Section of the human Fallopian Tube.

The ovary and tube are situated in the folds of the broad ligament, the superior fold being occupied by the latter. The ligament is continued to the ileo-pectineal line by the infundibulo-pelvic ligament. Between the tube and ovary, and within the fold of the broad ligament, is an embryonal body, which consists of a number of small tubes and cysts, and is known as the parovarium or organ of Rosenmüller. It is most probably the remains of the Wolffian body. The tubes of which this body is composed sometimes extend into the hilum of the ovary, and thus afford, according to some authorities, a congenital source of origin for some forms of ovarian cyst. A small, thin-walled cyst, known as the cyst or hydatid of Morgagni, hangs from the posterior surface of the Fallopian tube by a long pedicle. It has no pathological significance.

MALFORMATIONS OF THE OVARY AND TUBE.

Congenital absence of both ovaries occurs but rarely. When this malformation occurs, it is generally associated with defective development of the uterus. In such patients the physical changes in conformation incident to puberty do not occur, and the individual more closely resembles in appearance the male. When one ovary is absent, there is likely to be a deficiency in the development in the corresponding half of the uterus and tube. In a number of cases there has also been an absence of the corresponding kidney. A third or accessory ovary is very infrequent.

Doran asserts that small fibro-myomata in the ovarian ligament have been mistaken for supernumerary ovaries. Small islets of ovarian tissue have been found upon the peritoneum. Such a condition or the incomplete removal of an ovary undoubtedly has been the cause of menstruation subsequent to oöphorectomy.

Where the ovaries are absent or marked failure in their development has occurred, the sexual functions are never performed normally. The absence of one ovary or its serious involvement by disease constitutes no obstacle to either sexual intercourse or conception. It is very important to determine, if possible, that the ovaries are absent or rudimentary, as when these conditions are once recognized the absolute futility of any measures to establish menstruation is demonstrated.

MALFORMATIONS OF THE TUBES consist chiefly in defective development of the fimbriæ at their abdominal ends. The tube may be unusually short or have supernumerary ostea or openings. These openings may be provided with fimbriæ or the latter may be absent. An unusually convoluted tube is sometimes observed, evidently due to its defective development, resembling the condition seen in women prior to puberty. At times the convolutions of the tube form actual strictures, which contract its cavity sufficiently to render the woman sterile.

Displacements of the Ovary and Tube.

Hernia through the inguinal canal is a rare condition. It is generally found upon the left side. Hernia of the ovary may occur without the presence of any other organ in the hernial sac, unless it be the Fallopian tube. The presence of the ovary is generally secondary, however, and results from adhesions to the omentum and the intestines.

Most probably the first surgical removal of the ovaries was performed by Potts for ovarian hernia. The displaced organs may readily be mistaken for glands or labial tumors. The constant presence of a tumor, its physiological character, the dull, sickening pain, and extreme nausea, should aid in the diagnosis. The ovary has also been known to make its exit through the crural canal, the greater sacro-sciatic foramen, and the umbilicus. Such displaced organs may become cystic. Chenieux has reported a cyst of this variety in the right buttock which was mistaken for a lipoma.

Treatment.—Taxis should be judiciously and carefully exercised, the ice-bag or the sand-bag may be applied, and after reduction has been effected a truss should be worn. If the symptoms are annoying and reduction cannot be accomplished, the sac should be incised and the ovary replaced or removed, according to its condition.

Prolapsus Ovarii.—Displacement of the ovary may be dependent upon, or independent of, the position of the uterus. When the latter organ is retroverted, the ovary follows from traction through the ovarian ligament. In retroversion the ovary usually lies in front of the uterus, but it sometimes lies beneath that organ in the cul-de-sac. The ovary may be displaced and the uterus retain its normal position. The prolapsed ovary is exceedingly tender; the most frequent symptom is pain during or after defecation. The paroxysm thus produced may, in some cases, last an hour or more. Other symptoms are painful coition, dysuria, and dysmenorrhea.

Etiology.—Prolapsus is generally a sequel of gestation; the broad ligament becomes extended and the infundibulo-pelvic ligament may give way. Enlargement of the ovary from chronic inflammation or perimetritis may be important factors.

Diagnosis.—The diagnosis is made by the determination through vaginal and rectal examination of a mass in Douglas's pouch, which is movable, may be pushed upward, or whose pedicle can be distinguished by dragging upon the tumor. It is exceedingly sensitive, and pressure upon it produces a peculiar sickening sensation similar to that induced by pressure upon an inflamed testicle. If severe inflammation has occurred, the ovaries and tubes may be fixed behind the uterus.

TREATMENT.—The first consideration should be rest. The bowels must be carefully regulated and the marital relation be absolutely prohibited. The patient may be placed in the genu-pectoral position and the organs pushed up and maintained by a suitable pessary. The Thomas and Mundé pessaries prove the most satisfactory, as their thickened posterior bar affords more efficient support and decreases the possibility of the organ being pinched between the pessary and the sacrum. The occurrence of this accident is attended with agonizing pain, rendering the patient unable to move until the pressure is removed. When various pessaries have been unsuccessfully tried, and the patient is incapacitated for her duties, abdominal section should be performed, and ovarian fixation effected, either by restoring the infundibulo-pelvic ligament or suturing the pedicle of the ovary to that part of the anterior parietes corresponding to the exit of the round ligament. This operation may be associated with ventro-fixation of the uterus, when retroversion of that organ complicates the displacement. Descent of the ovary alone never justifies extirpation. The latter procedure should only be considered when the displacement is associated with marked oöphoritis or perioöphoritis.

CONGESTION OF THE OVARIES.—The ovaries are physiologically congested in ovulation and during coition. This congestion in excess or prolonged becomes pathological. An over-congestion of the ovaries is not infrequent at the establishment of the menstrual function, especially in individuals in whom the mental faculties have been developed at the expense of the physical structure. Girls are often too closely confined to school and to the study and practice of music when Nature is exhausting her forces in their development. Blood may extravasate into the follicles and stroma of the ovary, more frequently into the former. The hemorrhage into the follicles may distend the ovary to the size of a hen's egg or even to that of an orange. Later, this is converted into a pigment the consistency of honey, having a rusty chocolate color. Winckel has reported similar conditions associated with heart disease, typhoid fever, phosphorus-poisoning, and in extensive burns. The follicle generally does not rupture, but the ovarian tissue is completely destroyed. A case came under the observation of the author in which each ovary was distended to the size of a small orange, and consisted of thin-walled cysts filled with dark grumous blood. Follicular apoplexy, as well as ovarian congestion, generally occurs in the sexually immature. It may terminate in absorption, or the ovary may rupture and a large hemorrhage take place into the peritoneal cavity, causing fatal peritonitis.

The principal symptom of congestion of the ovary is pain in the lateral regions of the pelvis, for a week or ten days prior to the appearance of the flow, and becoming lighter or disappearing with its cessation. The escape of blood relieves the engorged organs, and the only period of comfort is experienced during menstruation. The flow is prolonged and excessive, frequently amounting to a hemorrhage. The patient becomes weak, pale, and anemic.

DIAGNOSIS.—The existence of this condition should be suspected from the age, near puberty—the excessive and prolonged flow, anemic appearance, weakness, pain and tenderness over the pelvis—which is generally more marked upon the left side—and not infrequently pain in the corresponding mammary gland. Apoplexy is rarely recognized, as it presents no distinctive symptoms.

TERMINATION.—Ovarian congestion under proper hygiene and treatment may disappear. Where it continues it is transformed into chronic inflammation. The collections of blood in follicular hemorrhage may be absorbed, leaving an enlarged cicatrix, or they may break down and destroy the ovarian structure, forming an ovarian hematoma. Extensive hemorrhage with rupture of the ovary may cause pelvic hematocele, or even death.

TREATMENT.—Attendance upon school, and particularly the study of music, should be discontinued; the reading of emotional literature interdicted; and out-door pursuits encouraged, such as riding and walking. City girls should be sent to the country or sea-shore. The bowels should be carefully regulated and a generous diet afforded, from which sweets and pastry must be largely excluded. A morning sponge-bath, followed by friction with a coarse towel, will be serviceable. Rest in bed for a few days prior to and during the entire menstrual period should be the rule. If the flow is excessive, the period should be preceded for a few days by the administration of the fluid extract of ergot, ʒss, or of ergotin, gr. ij, in capsule, three or four times daily and continued until the flow ceases. During the menstrual intervals potassium bromide, gr. xv, or potassium chlorate, gr. v, administered three times daily, with such tonics as quinine, strychnine, and the bitter tinctures, is required.

The anemia may tempt one to resort to the use of the salts of iron, but experience teaches that this remedy is of service only after the tendency to hemorrhage has ceased. Its earlier administration but aggravates the tendency to bleeding.

OOPHORITIS AND PERIOOPHORITIS.

Inflammation of the ovary may be acute or chronic. Anatomical distinctions of parenchymatous, follicular, and interstitial are made, but such distinctions are rarely determined clinically.

ACUTE OOPHORITIS.

In acute inflammation the ovary becomes enlarged, filled with cysts, or is œdematous; the cysts are filled with a cloudy serum looking like pus. The ovary may in a few days become three or four times its normal size. The cut surface will exude a large quantity of serous fluid, while in more severe grades a number of purulent yellow streaks will be seen starting from the hilum. A smeary mass will be discharged in some cases, while in others there will be the distinct pus-collection of an abscess. The organ may attain to the size of a man's head, though generally it is not larger than a hen's egg, when it produces the sensation to the examining finger of a firm mass. An inflammation of the ovary may progress to the formation of an abscess, and subsequently the watery contents be absorbed, leaving a cheesy mass. In the milder forms of inflammation resolution may take place. The connective tissue undergoes retraction, depressing the surface here and there, producing premature involution or cirrhosis of the ovary. The ovary may be reduced to the size of a hazelnut. This form of inflammation is prone to affect both ovaries, while the abscess is usually found in but one. In perioöphoritis the capsule of the ovary becomes thickened; the entire organ is bound down by perimetric bands of adhesions. The thickening of the capsule renders it less likely to rupture with the ripening of the Graafian follicle, and a small cyst remains. Under the influence of disturbed circulation a large number of follicles may mature at once, producing a cystic ovary. The partitions frequently break down, and a large cyst is formed.

Etiology.—The principal causes of acute oöphoritis are—injury, septic poisoning after parturition or abortion, gonorrhea, arsenical or phosphorus-poisoning, the exanthemata, acute rheumatism, and long-continued endometritis.

Sepsis, without doubt, is the most frequent cause; the next frequent is gonorrhea. Septic inflammation is very likely to result in abscess and a more or less extensive peritonitis. The left ovary is more prone to be the seat of such a destructive process, due, according to some authors, to the difference in its circulation. Gonorrhea produces perioöphoritis with a binding down of the ovary by adhesions.

Symptoms.—The patient complains of intense, lancinating pain, generally over the left inguinal region, associated with extreme tenderness, elevated temperature, rapid pulse, and frequent chills. In perioöphoritis the symptoms are less marked than those of mild peritonitis.

Course and Termination.—Acute oöphoritis may terminate in resolution and disappearance of the abnormal symptoms, the development of an abscess, its rupture, and the occurrence of a rapidly-fatal infective peritonitis, or the disease may become chronic.

Treatment.—The treatment should consist in absolute rest in bed, the administration of salines until free purgation is secured. Tincture of aconite, gtt. j–ij every hour, is of value. Leeches may be applied to the perineum and an ice-bag to the seat of pain, or, where better borne, hot fomentations with opium, or morphine given by the rectum may be applied, or where pain is very severe the morphia may be given hypodermically. When an abscess forms, the only acceptable treatment is surgical, as considered elsewhere.

Chronic Ovaritis.

Chronic inflammation is much more common than the acute disorder. It occurs during the period of sexual activity, and more frequently in the married. The ovary may be enlarged, presenting a number of cysts with little interstitial growth or increase of the fibrous tissue of the organ; subsequent atrophy, known as cirrhosis, occurs. The ovary may be fixed in the pelvis by an extensive infiltrate, so that it is immovable and scarcely to be distinguished, or it may be movable and prolapsed into the retro-uterine pouch.

Etiology.—Chronic ovaritis may be the sequel of the acute disease and due to the same causes. It is also produced by excessive sexual intercourse, masturbation, sexual excitement without gratification, suppressed menstruation, and to operations upon the cervix.

Symptoms.—Pain is an inevitable feature, experienced with the greatest intensity in the groin and with the greatest frequency upon the left side. It is persistent, increased by locomotion, by a misstep, or by jolting. It is greatly exaggerated as the menstrual period approaches. If the flow is free, amounting to a menorrhagia, the pain is relieved or may disappear; if it is but slight, the pain increases. When the pain from any cause is intensified, it extends down the thighs and over the sacrum. Not infrequently pain is felt in one or both mammary glands of such intensity as to lead the patient to suspect the existence of malignant disease. Symptoms of spinal irritation and attacks of migraine are frequent near the menstrual periods. Hysteria or hystero-epilepsy may be an accompaniment. Sterility is an almost constant result. The ovaries are generally tender to pressure, though they may not be to any considerable degree enlarged. When prolapsed behind the uterus with that organ resting upon them, they are sensitive to the slightest pressure, and cause pain in defecation, and especially in coition. Frequently the marital relations are so painful and produce so much distress that they are necessarily discontinued. Physical examination must be conducted with great care. When the organs are prolapsed and fixed behind the uterus by inflammatory exudate, the careless observer may mistake the condition for retroflexion of the uterus.

Diagnosis.—The determination of large and sensitive ovaries, exaggerated distress for a week or ten days prior to menstruation, mammary pain, with painful defecation and coition, leave but little room for doubt. When the physical signs obtained by vaginal touch are obscure, rectal examination will be of great service and should be a routine practice. Where the abdominal walls are rigid or the pelvic organs very sensitive, an examination under anesthesia may be of value in supplementing or confirming the diagnosis.

Treatment.—Where it is possible, the removal of the sources of irritation which have led to the production of the disease should be the first consideration. The marital relation should be suspended or infrequently practised; vigorous exercise or long standing upon the feet should be avoided. The patient should rest in bed during menstruation. Blood may be abstracted by leeches to relieve severe pain. Counter-irritation with iodine, blisters over the region of the ovaries, or mercurial inunctions may be beneficial.

Internally, the administration of the potash salts, as the iodide, bromide, or chlorate, alone or in association with the bitter tonics, as nux vomica and cinchona or their alkaloids, strychnine or quinine, often give marked relief.

Benefit has been claimed from the following:

℞. Auri et sodii chloridi, gr. $\frac{1}{20}$;
Extractum cannabis indicæ, gr. ss.—M.
Ft. cap.
Sig. Take one capsule three times daily.

Ichthyol may be given by the mouth, vaginal suppository, or by inunction over the lower abdomen. The bowels should be carefully regulated. Fixation of the ovaries may be overcome by the judicious use of pelvic massage. The severity of the attacks of pain may be much ameliorated by the administration of ten drops of tincture of pulsatilla, four times daily preceding the expected attack, and continuing it until the menstrual flow has been well established.

Fig. 335.

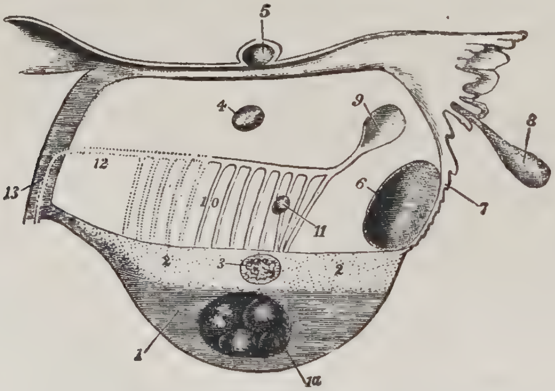
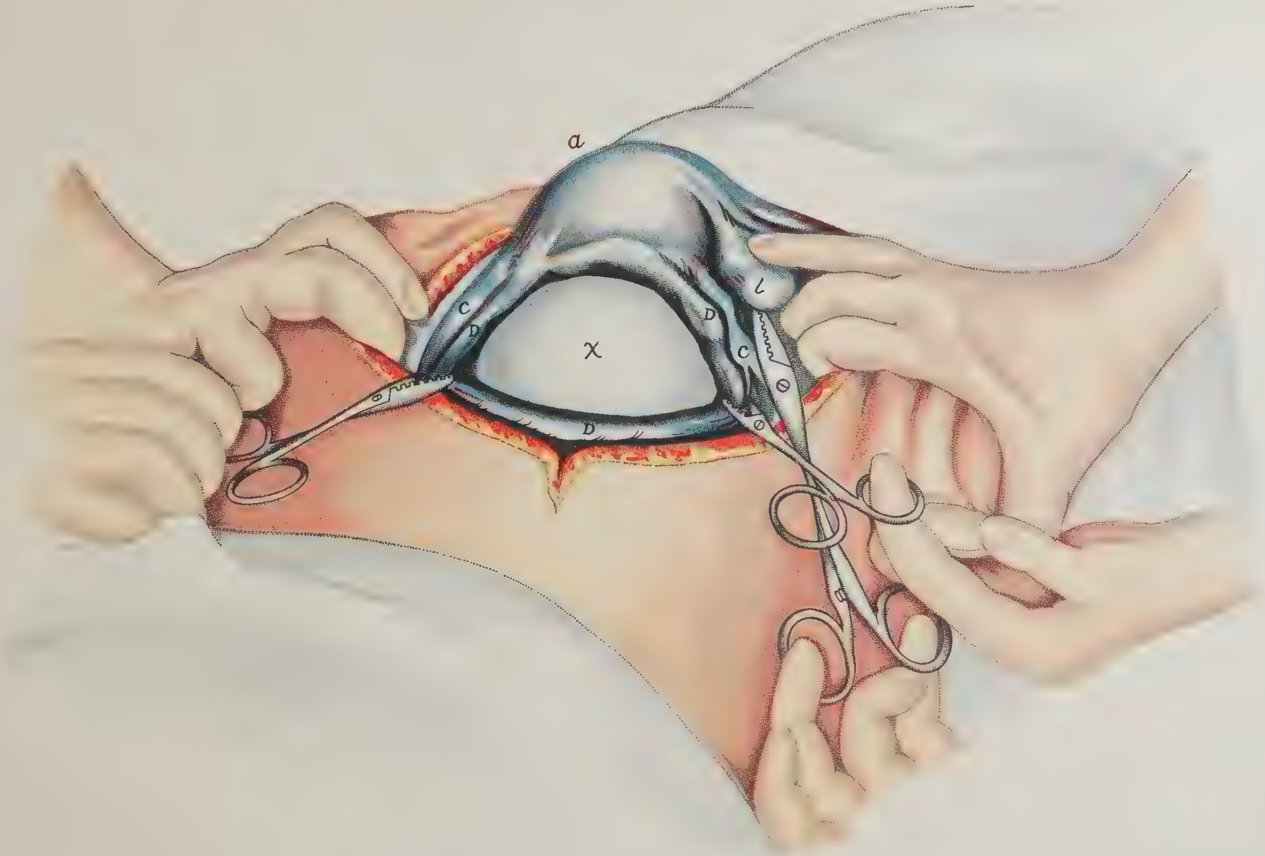


Diagram of the Structures in and adjacent to the Broad Ligament: 1, 1*a*, multilocular cystic tumor, developed in 1, parenchyma of the ovary; 3, papillomatous cystic tumor of the ovary in 2, tissue of the hilum of the ovary; 4, simple broad-ligament cyst, independent of the parovarium, 10, and the Fallopian tube; 5, a similar cyst in the broad ligament above the tube, but not connected with it; 6, a similar cyst close to 7, ovarian fimbria of the tube; 8, hydatid of Morgagni (this never appears to form a large cyst); 9, cyst developed from the horizontal tube of the parovarium; 11, cyst developed from a ventricle tube (cysts of this kind form the papillomatous tumors of the broad ligament); 12, 13, tract of the obliterated duct of Gaertner (papillomatous cysts are said to be developed along this tract).

In severe cases, or where all palliative measures have failed to render the patient comfortable, the offending organs should be removed.

PLATE XXXV.



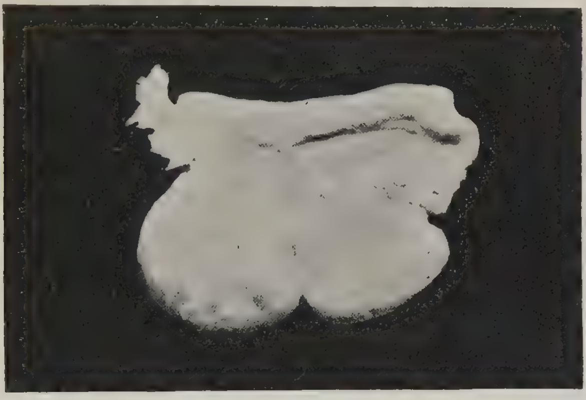
INTRA-LIGAMENTARY BROAD-LIGAMENT CYST (FROM PHOTOGRAPH).

A. Uterus.
b. Right ovary.
c, *c*. Fallopian tubes.

D, *D*, *D*. Edges of incised peritoneum held open with hemostatic forceps.
X. Cyst.

Ovarian Neoplasms.—The neoplasms of the ovary may be divided clinically into cystic and solid growths. The cystic tumors include simple, proliferating, and dermoid cysts. The solid tumors are fibromata, sarcomata, and carcinomata, and are comparatively rare. Cysts may originate in any part of the tubo-ovarian structure, as the cortical, medullary, or parenchymatous structure of the ovary; in its inferior border or hilum; in the structures between the tube and ovary known as Rosenmüller's organ or the parovarian structures; and in the hydatid of Morgagni, the extremity of the canal of Müller. Cysts are also developed in the folds of the broad ligament, and are known as broad-ligament cysts. The cysts may be unilocular with limpid contents, or multilocular with contents varying in different cysts, some clear and limpid, others thick and viscid or discolored with the admixture of blood, pus, or fat. The broad-ligament cysts are generally unilocular, containing clear fluid; those originating in the hilum, papillary; and in the parenchymatous tissue of the ovary, glandular.

Fig. 336.



Broad-Ligament Cyst, Fallopian Tube and Ovary.

The cysts may be divided pathologically into simple, proliferating, dermoid, and parovarian, or, according to size, into small and large cysts.

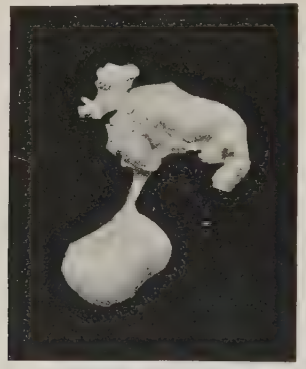
Under small cysts may be described, first, small residual cysts developing from Morgagni's hydatid or the horizontal canal of the parovarium; second, follicular; third, cysts of the corpus luteum; and fourth, tubo-ovarian cysts.

The large cysts include, first, the glandular proliferous; second, the papillary proliferous; third, dermoid, simple or mixed; fourth, parovarian, including several varieties, as hyaline, papillary, and dermoid.

CYSTS OF THE HYDATID OF MORGAGNI.

Attached to the fimbriated end of the Fallopian tube is generally found a cyst varying from the size of a pea to that of a cherry. It is transparent and has a thin wall. This hydatid is the remains of the extremity of Müller's canal, and is rarely absent. The length of its pedicle varies in different individuals. It is sometimes nearly an inch in length and very thin; in other cases it is short and thick. Doran describes a supra-tubal cyst about the size of the former and of the same appearance and structure. It is supposed to be a micro-cyst of the broad ligament which has slipped under the serous membrane and attained this unusual position.

FIG. 337.



Cyst of the Organ of Morgagni.

MICRO-CYSTS OF THE BROAD LIGAMENT.

These are small cysts which develop in the structure or are suspended from Rosenmüller's organ; other cysts are found free, and are of undetermined origin. Only those which originate from the vertical tubes of the parovarium have ciliated epithelium, and are likely to subsequently develop into papillary growths. The others, and even those which start in the horizontal tube, may become detached from the broad ligament and hang by a slender pedicle. These micro-cysts may possibly be the starting-points for large cysts with either fluid or papillary contents.

SIMPLE OR FOLLICULAR CYSTS.

These cysts are formed from unruptured Graafian follicles which become dilated. In an ovary which has not attained to twice its normal size may be found fifteen or twenty of these cysts. They were long considered as the only source of large ovarian cysts. It has, however, been discovered that it is only in rare cases that they attain to the size of a fist, or, at the utmost, to that of a man's head. They contain a light serous fluid with a specific gravity of 1005 to 1020. The cyst-wall is thin, has a light gray color, and is in large part a transparent membrane. The disease is generally bilateral.

ETIOLOGY.—These cysts, even when of large size, are regarded as dilated Graafian follicles, because of the different gradations observed between them and the smaller cysts. In the smaller size ovula may be detected, which may have been destroyed or have escaped observation in the larger.

Dropsy of the follicle is occasioned by its failure to rupture with the increase in its fluid contents. The rupture may be prevented by its deep situation, thickening of the tunica albuginea, or deposits of peritonitic exudation over the surface of the ovary. It may also be caused by too slight a menstrual congestion, which, though increasing the secretion, is insufficient to produce rupture.

CYST OF THE CORPUS LUTEUM.

This cyst was first described by Rokitansky, who believed that the corpus luteum of pregnancy only could be transformed into a cyst, but such cysts have been found in the nulliparæ. They are generally not larger than a walnut, but cases have been described in which they have attained the size of an orange or an apple. Nagel even speaks of one which had reached the size of the adult head. Microscopical examination shows the bud-like papillæ in the walls characteristic of the corpus luteum. The recognition of this prevents their confusion with follicular cysts, or even with suppurative ovaritis.

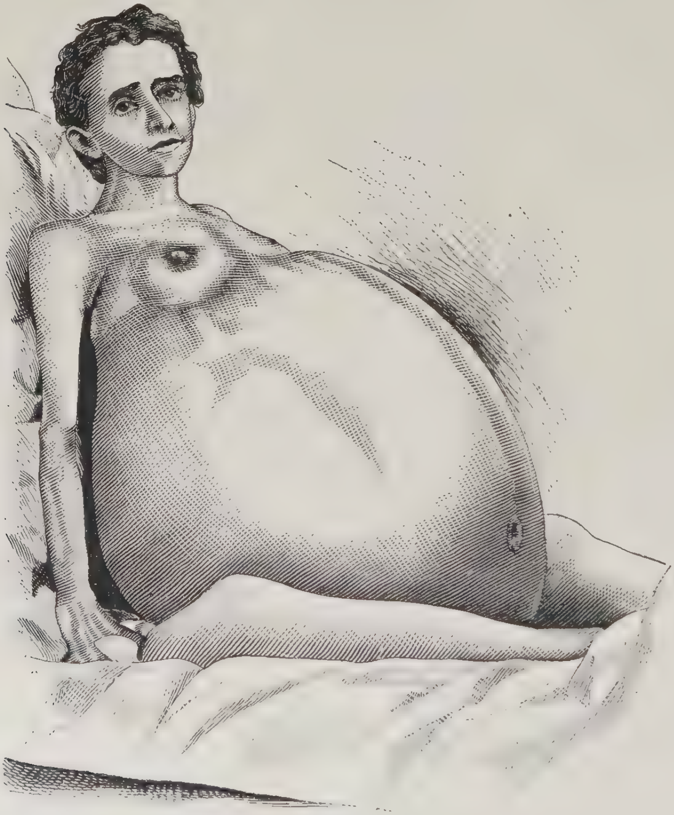
TUBO-OVARIAN CYSTS.

The presence of an ovarian cyst not infrequently results in the formation of a tubo-ovarian cyst through its proximity to a distended tube. Tubal inflammation early results in fastening the ostium of the tube to the ovary by firm adhesions. A dilated follicle or a small cyst may readily rupture into a distended tube, with which it is in juxtaposition, and form one sac, the smaller part of which is generally furnished by the tube. They do not usually attain to a large size. The Fallopian tube may remain permeable, and as the fluid increases the overflow passes into the uterus; a condition known as profluent ovarian hydrops is thus formed. It may be compared with the condition engendered by hydrosalpinx known as profluent hydrops tubæ. The open tube may act as a safety-valve, preventing the growth and over-distension of the cyst, and in some cases leading to its complete prolapse after every evacuation.

LARGE CYSTS.—PROLIFERATING CYSTOMATA.

The term "proliferation," as applied to cysts, refers to those which are highly organized and abundantly supplied with blood-vessels.

FIG. 338.



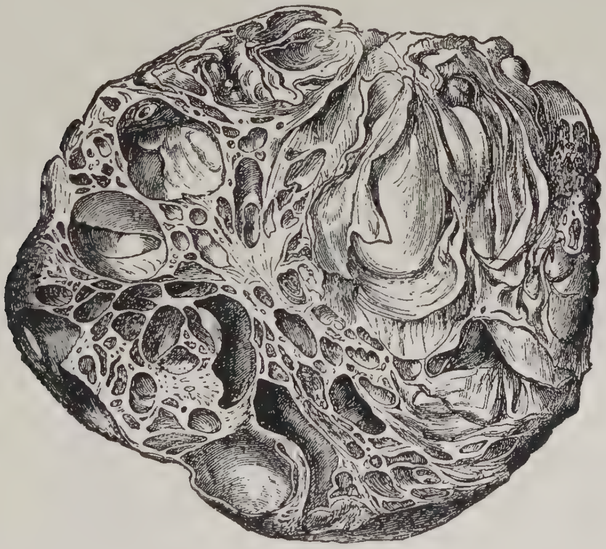
Large Ovarian Cyst, weighing 149 pounds.

The term "proligerous cysts" is also applied to them, and indicates their faculty of budding and generating new cysts from or within the original growth. In shape they may be spherical and regular in outline, simulating the presence of a single cyst, or irregular, presenting nodules, indicating a multilocular tumor.

They may vary from the size of an egg to that of a tumor weighing more than one hundred pounds, filling up the entire abdomen and encroaching upon the thoracic viscera. When exposed the cysts present a pearly-white, glistening appearance. The thinner portions are purple, green, or black according to the color of their individual contents. The external surface may be smooth and oily, covered with papillary growths or mucous vegetations. The tumor generally has a distinct pedicle. The consideration of the internal structure of ovarian cysts justifies their division into areolar, unilocular, and multilocular.

Areolar.—When an areolar cyst is opened it is found filled with spurs or trabeculæ of small cysts which have ruptured to form a large main cyst, or it may be made up of a large number of small cysts bound together by loose connective tissue almost gelatinous in appearance. In a tumor of this kind, removed from a young woman, a large number of small cysts were found. Although the tumor was as large as a pregnant uterus at full term, it contained no cyst larger than a good-sized plum.

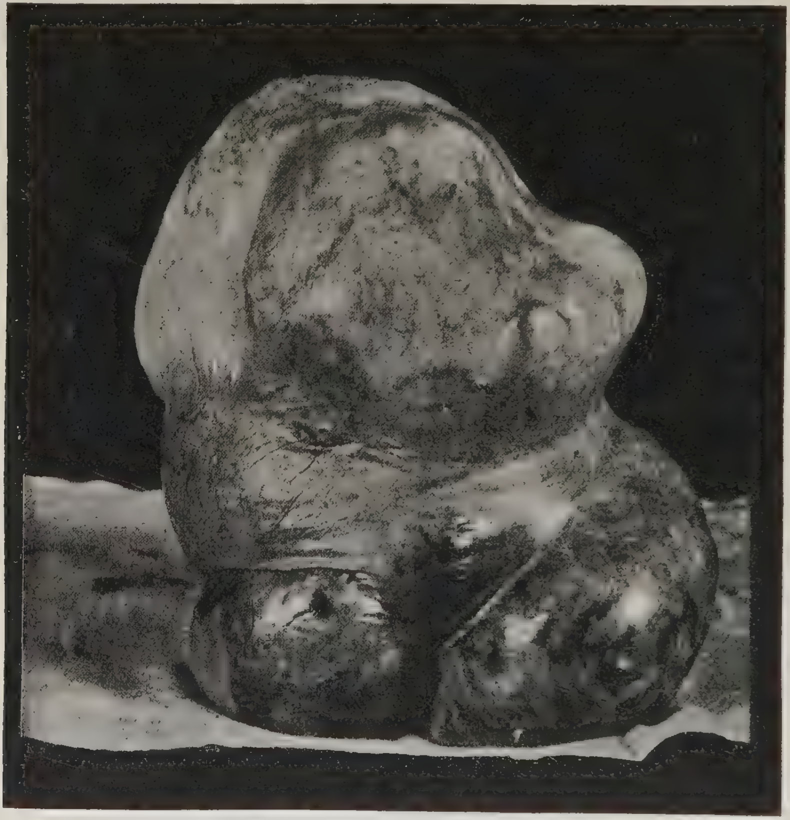
Fig. 339.



Proligerous Glandular Ovarian Cyst of areolar appearance.

Unilocular cysts attain to an enormous size, but are found to contain evidences of previous division into smaller cysts, and it may be asserted that all unilocular cysts arise from the multilocular: even in the large tumors close examination will disclose small cysts in their walls.

Fig. 340.



Multilocular or Glandular Cystoma.

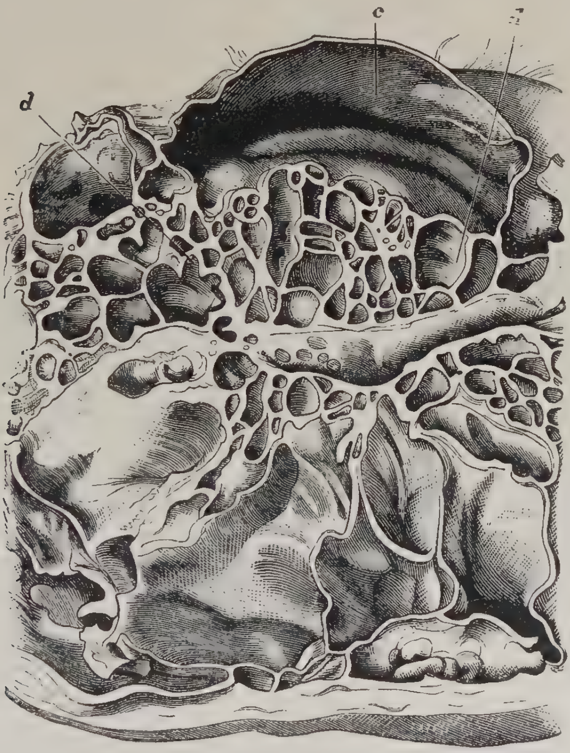
Multilocular cysts are so called because they contain a number of cysts of nearly equal size, so arranged as to present the appearance of one large cyst.

The cyst-wall can be divided into three layers—an outer and an inner of fibrous, and a middle layer of connective, tissue. In the latter the vascular supply is distributed, and it sometimes contains vessels as large as the femoral vein. In areolar cysts these vessels can be seen coursing upon the surface, and when wounded may cause dangerous or even fatal hemorrhage. Large vessels are frequently found free in the gelatinous contents of large cysts, and remain after the destruction of the former septa. Such vessels may be the source of hemorrhage into the cyst.

The external surface of the cyst is covered by columnar epithelium differing from the pavement epithelium of the peritoneum. The internal surface is lined by low cylindrical cells. Section of the cyst-walls shows depressions of the endothelium resembling acinous glands with a narrowed opening. The lining membrane may be covered with vegetations formed from proliferated stroma, simulating myoma or fibro-sarcoma. These tufts are covered with a single layer of endothelium. Epithelial prolongations of a tubular form may penetrate from below upward, presenting the appearance of carcinoma.

The contents of the cysts often present marked contrasts in color or consistency; thus they may be found either almost colorless, straw-colored, green, purple, or black in color, thin, and thick, viscid, or gelatinous in consistency. The contents may vary in color and consistency in different cysts of the same tumor. The fluid in the smaller cysts is generally more consistent and becomes thinner as they increase in size, the result of changes in the structure of the epithelium.

FIG. 341.



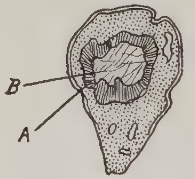
Portion of an Ovarian Adenoma, showing the varieties of loculi: *c*, primary; *d*, secondary.

Proliferating cysts may be divided into two classes: first, those in which the vegetations are derived from the epithelium and from glandular tubes, proliferous glandular cysts, or adenomata; second, those in which the connective tissue of the walls develops and projects as vegetations—proliferous papillary cysts. These cysts do not differ essentially in their origin.

The walls of the cysts may undergo the following degenerative or retrogressive processes:

1. *Calcification* most frequently takes place in the inner layer of the main cyst-wall as deposits of granules or small plates of lime or the formation of psammatous bodies, as seen in the papillary cystomata. The calcification increases with impairment of nutrition, as occurs in gradual torsion of the pedicle.

Fig. 342.



Calcified Corpus Luteum: *A*, calcified portion; *B*, interior of the corpus luteum.

2. *Fatty degeneration* occurs in the papillary cells, which are regenerated, while the desquamated fatty cells are destroyed. A similar change takes place in the connective tissue and walls. The process is enhanced by any impairment of nutrition. The pressure of cyst-contents induces this change in the septa, resulting in their partial or complete destruction. The presence of a large amount of fat in the fluids is indicative of slow growth.

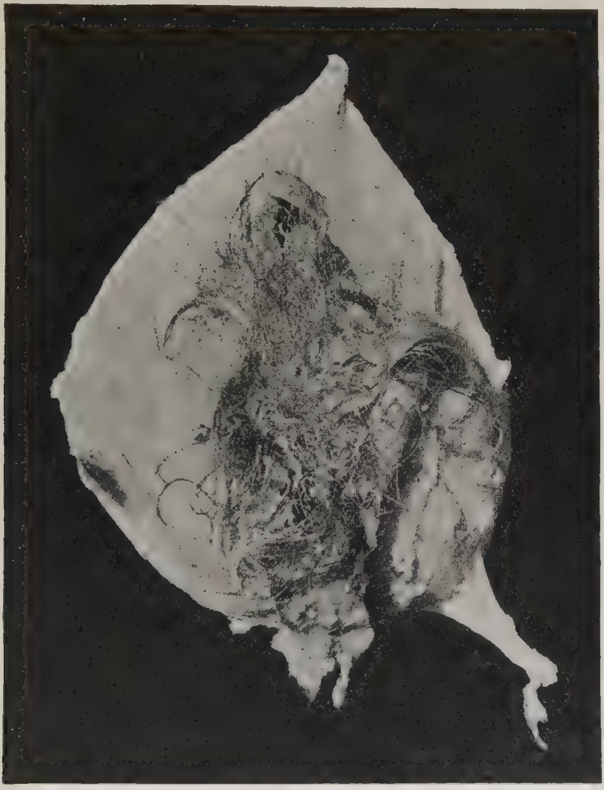
3. *Atheromatous* changes, which generally take place in the inner layer of the wall.

4. Changes due to infarctions in which whitish opaque bodies will be found in the septa surrounded by a red zone.

Papillary Cystomata.—These cysts were formerly regarded as a variety of the glandular. They are believed to have developed from the paroöphoron, in the broad ligament, or in the prolongations of its tumors into the hilum of the ovary. They differ from ordinary ovarian or oöphoritic cysts in that, first, they produce no effect upon the shape of the ovary until they have attained a large size; second, they burrow beneath the layers of the mesosalpinx, and when of large size separate the layers of the broad ligament beside the uterus; third, their interior is filled with warty growths. These warts form cauliflower growths, or masses which over-distend and rupture the cyst-walls, from which they extend to the adjacent organs, particularly the peritoneum. The cysts rarely attain to large size, and in the majority of cases are bilateral.

When the cyst ruptures, the dendritic masses infect the peritoneum, producing growths upon the adjacent tissues. These are reddish or pearly-white and glistening masses, or in some cases growths three or four inches long projecting in every direction and having the appearance of stems of coral. These masses have usually partly undergone calcification, so that they break easily and without bleeding.

Fig. 343.



Dermoid Cyst containing long red hair, removed from a light-haired woman aged 44 years.

These tumors are characterized by slow growth, by frequent and early pressure-symptoms, and generally by the early presence of ascites, which soon returns after puncture.

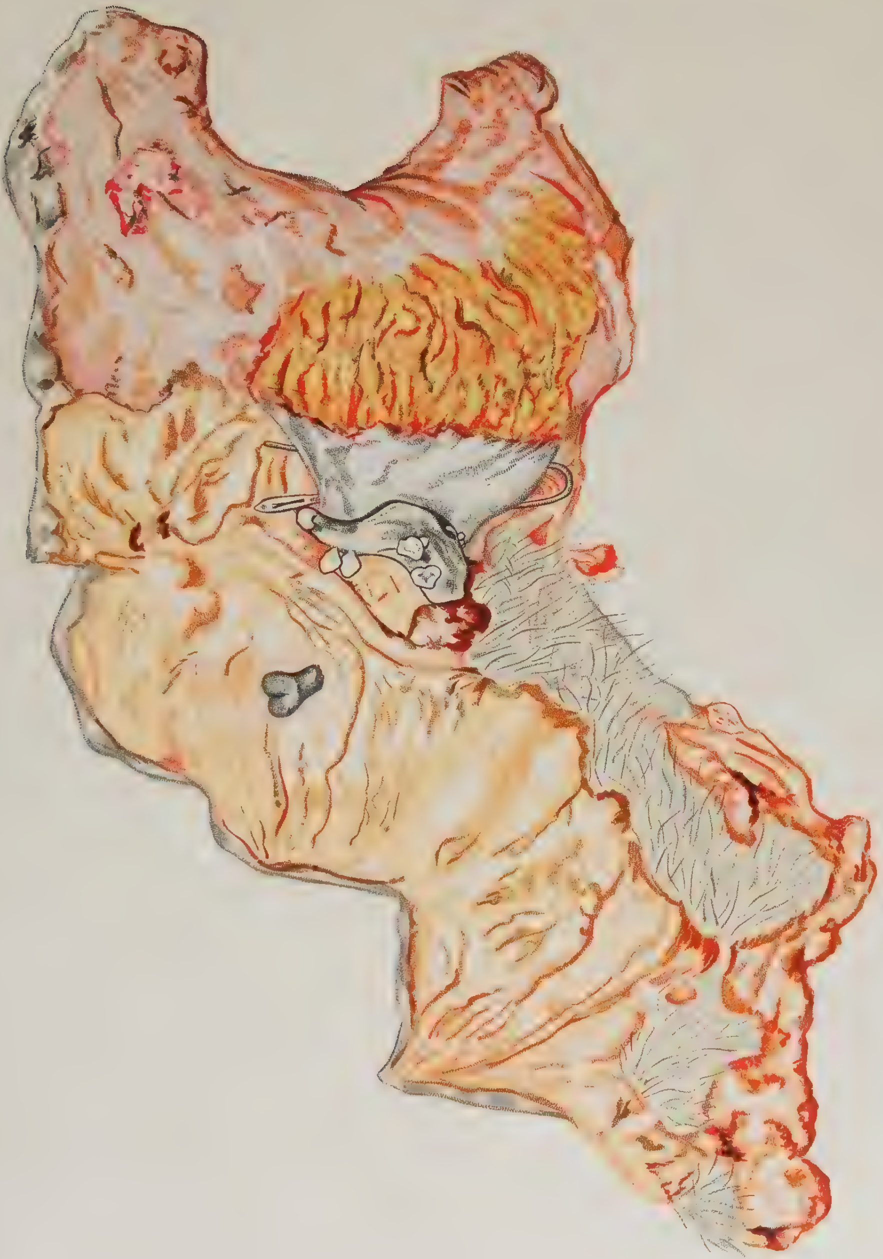
The writer has had a number of cases of the growths under observation. In a recent one the involvement was bilateral and beneath the peritoneum, dissecting it off from the posterior surface of the uterus and obliterating the retro-uterine cul-de-sac. A large quantity of ascitic fluid was drawn off, when the entire peritoneum, parietal and visceral, was found studded with small red masses. In another patient the entire surface of the uterus and broad ligaments was covered with dendritic masses three inches long, which had become partially calcified. Specimens of such growths are represented in the illustrations. The danger of peritoneal infection precludes tapping when there is any reason to suspect such a growth.

OVARIAN DERMOIDS.—Dermoid tumors are those in which are found skin or mucous membrane associated with the structures generally connected with such tissues. The tissues most frequently found are hair, teeth, nails, sebaceous and sweat-glands, and mammæ, horn, bone, unstriped muscular fibre, and, in rare cases, a tissue resembling brain. The hair varies in color, length, and quantity. It is not always of the same color as that of the person from whom the tumor is removed. The sebaceous glands are numerous and produce an extensive accumulation of fatty material. The teeth are irregular, generally imperfectly formed, though presenting the structures of dentine and enamel. They vary in number from two or three to several hundred. They may dot the surface of a membrane or be inserted in thin spicula of bone. The bone is generally loose, ill-formed, and irregular.

These growths may appear at any age. They have been found in children at birth and in women of ninety years. A tumor removed from a girl aged eleven years had been noticed when but eight years of age. It involved both ovaries, and the fundus was imbedded in the mass. The neck of the uterus was made to form the pedicle. The tumor contained a large quantity of sebaceous material—hair, bone, teeth—and at one point a mass resembling one side of the upper jaw covered with mucous membrane and containing a row of teeth.

Fig. 343 was removed from a woman aged forty-four years, who had given birth to six children. It contained hair and sebaceous material. Cullingworth reports a woman, in whom both ovaries were apparently involved by dermoids, who had given birth to twelve children and had three miscarriages—the last three months before the removal of the growths.

PLATE XXXVI.

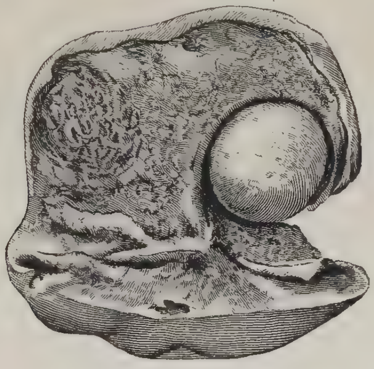


Dermoid Cyst Laid Open, showing Maxillary Bone containing teeth; the head of one of the long bones; skin with hair growing from its surface; serous membrane (probe passed underneath); mucous membrane of stomach directly next to serous membrane.

The rupture of ovarian dermoids is followed by peritonitis. The irritating character of their contents contraindicates puncture prior to their removal. The writer has seen a case in which an attempt at aspiration was followed by an attack of peritonitis which proved fatal, notwithstanding ovariotomy was performed three days later.

Solid Tumors of the Ovary.—The solid growths of the ovary comprise 5 per cent. of the cases which present themselves for operation, and may be divided into three groups: the fibro-myomata, sarcomata, and carcinomata. The first group is frequently divided into two groups: the fibromata and myomata. The former are rare, and comprise those growths in which the minute structure consists of wavy bundles of fibrous tissue closely packed, intermixed with small round cells. In a few instances these growths attain a large size. Williams described one which weighed seven pounds seven ounces; Doran, one of seventeen pounds. The *myomata* are more frequent than the former, but are not common. These tumors are prone occasionally to undergo calcareous degeneration, and are under these circumstances often mistaken for osseous tumors—a variety of ovarian degeneration which rarely if ever occurs.

Fig. 344.



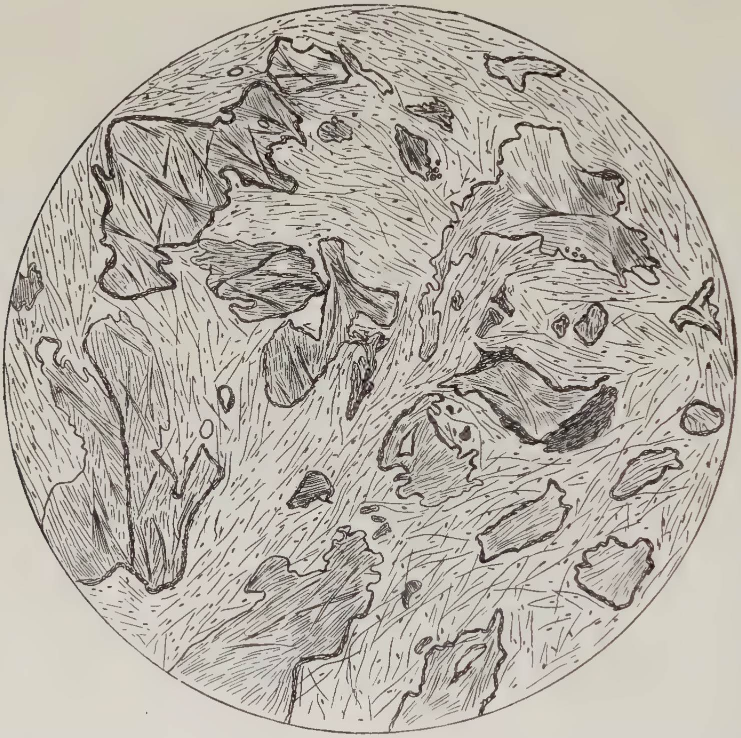
Calcified Fibroma of the Ovary.

Unstriped muscular fibre occurs in the ovary as a continuation of the ovarian ligament. Tumors of the ovary composed of this tissue sometimes attain to large size. Sutton mentions a specimen in the Museum of the Royal College of Surgeons removed from a woman aged 68 years, which weighed fifteen pounds two ounces.

Sarcomata of the ovaries differ from those diseases in other parts of the body in that both organs are likely to be affected simultaneously. They may belong to the spindle- or round-celled varieties.

The former are the more frequent. The majority of solid ovarian tumors will be found to belong to this class. Sarcomatous tumors grow rapidly. Carter describes a specimen which attained a weight of ten pounds in six months.

Fig. 345.



Showing the Structure of Calcified Fibromata. The darker portions represent areas of calcification.

Carcinomata.

Cancer of the ovary is rarely primary. It generally is secondary to ovarian adenomata. The latter possess, with carcinomata, a common feature in the presence of epithelium arranged in a definite manner, and experience has shown the tendency of carcinoma to develop upon adenomatous growths. Secondary cancer, in at least one half the cases, affects both organs.

Parovarian Cysts.

Cysts of the parovarium may be divided into those which occur in the outer series of tubules free at one extremity and known as Kobelt's tubes, an inner set of vertical tubules, and lastly a large tube running at right angles to the vertical tubes may be occasionally traced downward to the vagina. This is Gärtner's duct. There are two kinds of cysts which arise from the parovarium; the most frequent are the small pedunculated cysts connected with Kobelt's tubules, which do not become larger than a pea, and consequently have no clinical importance. The most important are the sessile, which remain between the layers of the mesosalpinx, and as they enlarge burrow into it. In these large cysts the Fallopian tube becomes elongated. Small cysts are usually transparent; when they become larger than a cocoanut this appearance is lost. The fluid is clear, limpid, with a specific gravity of 1010 and an alkaline reaction. They are distinguished from the ovarian cysts, first, by the ease with which the peritoneal coat can be stripped off; second, by the ovary being generally found attached to the side of the cyst; third, by the cyst being unilocular; fourth, by the Fallopian tube being stretched over the cyst and never communicating with it; fifth, by the specific gravity which does not exceed 1010, and may be lower; and lastly, in the same specimens, by the tissue of the mesosalpinx which becomes gradually thickened. These cysts rarely occur before the age of sixteen; they probably form about 10 per cent. of the cysts which are subjected to operation. They generally do not form adhesions, and rarely suppurate even when tapped.

Pedicle.—In all varieties of cysts of the ovary or the broad ligament the presence, absence, or character of the pedicle is of great surgical importance. It may be thin, almost membranous; long and narrow, consisting only of the folds of the peritoneum or of peritoneum and elongated tube; or may be broad and thick, comprising the entire broad ligament. Its length and thickness will depend upon the proximity of the cyst to the uterus. The pedicle consists of two parts—the ovarian ligament and the Fallopian tube.

The thick pedicle may consist of the broad ligament, hypertrophied and reinforced by muscular tissue from the uterus. When there is no pedicle the tumor has developed wholly within the broad ligament The tumors of the broad ligament, some dermoids, and glandular cysts of the ovary are of this class.

In the recent removal of cysts of this character the peritoneum is separated from the posterior surface of the uterus, while the tumor dips down upon the left side of the uterus to the roof of the vagina, leaving a large membranous cavity.

Etiology.—Ovarian cysts may occur at any age, and are not infrequently found in the fetus. Doran describes fetal ovaries which contained cysts $\frac{1}{12}$ to $\frac{1}{6}$ of an inch in diameter, lined with cylindrical epithelium and filled with dendritic vegetations. Congenital ovarian cysts may be either unilocular or multilocular, unilateral or bilateral. Sutton analyzed 60 cases in children under fifteen years of age, in which he found 23 dermoid, 16 sarcomata, and 16 simple cysts. Thornton has observed cases in which malignant deposits were found in the pelvis two or three years after the removal of dermoid cysts, which contained soft white growths strongly resembling sarcomata. Sutton arranges the group of malignant tumors in children—termed by some sarcomata, others carcinomata—under the term oöphoromata, because they seem to arise from the tissue of the oöphoron. Ovarian growths occur with greater frequency during the age of sexual activity, between the twentieth and fiftieth years. They are comparatively rare after sixty, and still more so before puberty. The unmarried seem to suffer with greater frequency from these growths. It is probable that the cessation of ovulation during pregnancy and lactation acts as a safeguard against their development, while menstrual congestion favors it. Several members of the same family have been affected. Each ovary seems to be attacked with equal frequency. It is estimated that the ordinary cystomata occur bilaterally in about 3 per cent., while the malignant, on the other hand, are found bilateral in about 75 per cent. Scanzoni has considered chlorosis during puberty as a main element in their development.

Symptoms.—The tumor usually develops insidiously, and may attain considerable size before it is discovered, being then, possibly, noticed by accident. The earliest symptoms are vesical tenesmus, constipation, pain in defecation, and the sensation of weight and pressure in the pelvis. As the tumor increases in size general nutrition becomes affected, due to the pressure upon the stomach and diaphragm. The patient becomes emaciated, grows weak, and suffers from violent abdominal pains, produced possibly by a partial peritonitis. Œdema may occur in one or both legs and extend to the vulva or lower abdominal walls. The patient may have intercurrent febrile attacks, and death may occur from exhaustion, or where the tumor fills the pelvis it may produce incarceration similar to that resulting from retroversion of the pregnant uterus.

Olshausen divides the subjective symptoms into four classes or groups: First, those produced by violent disease. This may be dysmenorrhea, but more frequently early and excessive hemorrhage. Excessive menstruation in bilateral tumors and tumors of the broad ligament is an early and obstinate symptom, due to the pressure upon the pelvic veins. Ergotin and other agents are useless in controlling the bleeding. This hemorrhage produces anemia. Sterility may result from the disease, partly from physiological and partly from mechanical causes. It must not be forgotten, however, that conception may take place even when the patient is suffering from large tumors. The presence of tumors may cause pigmentation of the mammary areola and the linea alba, painful sensation in the breasts, and even enlargement of these organs, with the secretion of milk. Second, symptoms which result from depression or weight of the tumor. These are constant after it has attained to some size. When it is situated in the pelvis it may produce tenesmus or strangury by pressure upon the neck of the bladder. A large tumor may produce upward traction on the bladder and urethra, and cause vesical disturbances, and even retention of urine. Defecation is impeded by pressure, and becomes painful if the tumor is sensitive. The patient suffers from vague, dragging pains, rupture of the rete Malpighii, and consequent formation of linea albicantes, dilatation of the veins, œdema of the abdominal walls, compression of the stomach and intestines, and difficult breathing from the pushing up of the diaphragm. This pressure necessarily adds an increase of danger to any inflammatory trouble of the lungs. As a result of compression of the renal veins and ureters the patient may suffer from albuminuria or from suppression of urine by the compression of the ureters. The compression of the large abdominal veins causes marked œdema of the legs, though this is less frequent than in pregnancy. The tumor must be larger than the pregnant uterus to cause these symptoms. Third, symptoms of complicating disease. Of these the most frequent and important are those which arise from attacks of circumscribed peritonitis. These symptoms are usually found in large tumors where they extend above the umbilicus. Loss of a portion of the superficial epithelium of the tumor necessarily results in its adhesion to adjacent parts. The greater the pressure of the tumor against neighboring organs, the more readily will the friction produce adhesions. This is more likely to occur in the anterior surface of the tumor, producing adhesions between the tumor and anterior parietes. Next in frequency are omental adhesions, and then follow adhesions to the intestine, bladder, uterus, spleen, stomach, liver, and floor of the pelvis. These produce attacks of pain, lasting for days or weeks, with tenderness of the parts affected. Other complicating symptoms are pressure upon the intestines, producing intestinal irritation or obstruction; intestinal occlusion from pressure upon the rectum, or occasionally, after puncture, from twisting of the intestines where they have been adherent. Fourth, symptoms on the part of the general condition of the patient. The general health of the patient usually remains good until the digestion is impaired by pressure upon the stomach. Then marasmus occurs, appetite is lost, the tongue becomes dry, there is persistent vomiting, and the features become sunken; the expression of the face with the enormously distended abdomen presents symptoms which usually indicate the presence of the disease.

Before taking up the study of the objective symptoms or physical signs of ovarian cysts we will enter upon the consideration of complications arising from changes in the cyst itself. These are—first, hemorrhages; second, suppuration and gangrene of the cyst; third, adhesions; fourth, torsion of the pedicle; fifth, rupture; sixth, metastatic deposits.

Hemorrhage into the cyst occurs from a variety of causes. It may take place in papillomatous cysts if the superficial vessels are greatly distended, or from the cyst-wall where the veins have ruptured by dilatation. The most frequent cause is from torsion of the pedicle. Moderate torsion interferes with the return of the blood through the veins, while the arterial circulation may still be maintained. It may take place from puncture through injury to a large vessel in the cyst-wall. Hemorrhage usually occurs slowly and in small quantities, and consequently is of no prognostic significance. Where copious, as in acute torsion of the pedicle or where large vessels are punctured, it may seriously threaten life and produce profound and dangerous collapse.

Inflammation and suppuration of a tumor may be produced by a number of conditions. Thus they may result from infection through the intestinal canal, urinary bladder, Fallopian tube, or the admission of air in tapping. This may affect small as well as large cysts. Dermoids are especially prone to suppuration. The most common avenue of infection is through the Fallopian tube. Adhesions generally take place in the immediate neighborhood of its ostium, affording opportunity for inflammation to extend over the cyst, thus causing adhesions to the omentum, intestines, and parietal peritoneum. The intestines are sometimes the source of infection through adhesions of the small intestine or the rectum to the cyst-wall. As the adherent piece of intestine becomes compressed by the tumor, its wall becomes thinned, allowing the diffusion of intestinal gases. It may become so thin as to permit the gas to pass directly into the cavity of the cyst, causing putrefaction and converting it into a huge abscess; in some cases the inflammation has originated in an appendicitis. It was formerly supposed to be due invariably to the accidental admission of air through tapping, but, as we have seen, it may occur independently of that cause. In acute cases, where inflammation results in early adhesions to the surrounding structures and viscera, marked symptoms arise, and unless the pus finds exit the patient dies. When exit is afforded, the patient may be worn out by the prolonged discharge.

Symptoms are pain, tenderness over the region of the tumor, rapid and feeble pulse, great emaciation and exhaustion, with a temperature of 102° in the morning, 103–106° in the evening, or where the patients have become greatly exhausted the temperature may fall as low as 95°, especially when the pus is in considerable quantity. The urine may be found to contain albumen, and the cyst, through its communication with the intestine, may contain gas, producing a tympanitic note. Suppurating dermoids are not of infrequent occurrence, often cause extensive adhesions, and burst into the peritoneum, rectum, bladder, vagina, or even through the abdominal wall. Communication of such a tumor with the bladder excites profound distress. Portions of bone, teeth, locks of hair, or sloughs become packed in the urethra, and cause retention of urine and the occurrence of cystitis. Fragments remaining in the bladder are covered with phosphatic deposits and form a nucleus for the formation of calculi.

Adhesions, when extensive, are always a source of additional anxiety. When they have existed for some time between the intestines, colon, and cyst-wall, forming broad, fibrous bands of close adhesions, the task of removal is an exceedingly tedious, and occasionally an impossible one. The adhesions result from inflammation of the surface of the peritoneum, the exudation from which is slowly converted into fibrous tissue. If the parts remain in contact during the formation of the adhesions, what is known as a sessile adhesion is produced. If movement is kept up, the bands of adhesions are elongated, forming broad or narrow bands. The cyst may present a shaggy appearance from extensive adhesions. The older adhesions contain blood-vessels, which are of large size when the intestine or omentum is involved. The vessels thus formed are frequently so large that when a pedicle has been destroyed by torsion the tumor is still nourished by its new relation. The most dangerous adhesions are those in the pelvis, on account of their intimate relation with the iliac arteries and veins, and it is in many cases exceedingly difficult, if not impossible, to determine their presence until operation is resorted to. In separating pelvic adhesions in a patient sixty-three years old, some years ago, using but very slight force, a large vein was torn open, and the patient lost so much blood before the hemorrhage could be arrested that she died a few hours later from shock.

Axial rotation, or *torsion of the pedicle*, occurs in probably 10 per cent. of the cases. It has been attributed to a variety of causes, as the alternate distension and evacuation of the bladder, passage of feces through the rectum, sudden movements, unusual exercise, the occurrence of pregnancy, delivery of the patient, and so on. It is more likely to occur in double ovarian tumor. It is possibly also induced by changes of position of the patient. The rotation varies from half a circle to as many as ten or twelve complete twists. The rotation takes place from right to left or left to right with about equal frequency, dependent, possibly, upon the side on which the tumor is situated. The tendency is to rotate toward the median line rather than from it. The effect on the circulation depends upon the amount of torsion as well as upon the thickness of the pedicle. A long, thin pedicle is the most frequently twisted. The veins are the first to suffer from the twisting, causing acute enlargement of the cyst from extravasation of blood into its cavity. The veins may rupture and hemorrhage take place into the cavity of the cyst—hemorrhage so profuse as to produce acute anemia and even death. On opening the abdomen of such a patient, the cyst will be found dark-colored, more particularly near the pedicle. The fluid in the cavity may be chocolate or dark-red in color. The most frequent effect of torsion is thrombosis of the vessels, extravasation of blood, and necrosis. Necrosis is followed by decomposition and putrefaction of the dead tissues.

Torsion may be acute or chronic. In the latter the changes are slow. Acute torsion is generally seen in small tumors. The larger the tumor, the more profound is the constitutional effect. Symptoms of acute rotation are frequently so marked as to leave no question as to the condition. When the patient complains of sudden and violent pain in the abdomen, vomiting, and the presence of acute swelling, one should suspect its occurrence. This is still more probable if the woman be pregnant. The rupture of the gravid Fallopian tube may induce symptoms which would be mistaken for torsion. The indications for prompt relief, however, are the same in each case. The symptoms in the chronic variety are not so marked. The patients complain of a dull, sudden abdominal pain, and still maintain good health, with a tumor, however, which more rapidly increases in size. In these cases the prognosis is good if the adhesions are few or slight.

Rupture of the Cyst.—Rupture of the cyst may be sudden, as the result of a fall, blow, or injury, or gradual from change in the cyst-wall. In the latter the cyst becomes thinner, more particularly in the proliferating cystomata. In such growths, as they increase in size, the accumulation presses upon their walls, which become thinned, until they give way at some point or until the papillary growths project through the thinned walls. Rupture of the cyst may take place into adherent viscera, and more generally occurs into the peritoneal cavity. The result of such a lesion is dependent somewhat upon the quantity and quality of the fluid contained. In the *unilocular* cysts the fluid is most innocuous, and may frequently produce no abnormal symptoms other than an increased diuresis. The patient probably passes several gallons of water in twenty-four hours. The abdomen, so prominent from the tumor, becomes flattened, flabby, and possibly the remnant of the cyst may be recognized upon palpation. Rarely the cyst-wall may shrivel and a radical cure be effected. In the multilocular cysts, and particularly the dermoids, rupture into the peritoneal cavity may be followed by infection, a rapidly developing grave peritonitis, and finally death. This termination is particularly probable, not only in dermoids, but in those containing colloid material, or particularly where pus is present in the cyst. In dermoids the decomposing fat is eminently productive of inflammation. Death may be very rapid as a result of the shock or the absorption of the deleterious material. In papillary cystomata rupture results in the infection of the peritoneal cavity and the formation of growths upon its surface, in some cases studding the entire peritoneum. Rupture is determined by disappearance of the tumor, diminution in its size, demonstration of free fluid in the abdomen, peritonitis, collapse, and diaphoresis or diuresis. Rupture into the peritoneal cavity may be mistaken for torsion; when into the intestines, it is recognized by the evacuation of colloid masses or chocolate-colored fluid; where the opening is high up, violent watery diarrhea may occur; when into the bladder, by vesical tenesmus and dysuria; or where dermoid, it is recognized by the peculiar contents of the cyst. External rupture is usually determined without difficulty. When pus or ichorous material alone are discharged, it is sometimes difficult to determine whether it proceeds from a cyst or an abscess in the walls.

Metastasis occurs in cancer of the ovary extending to the peritoneum, causing ascites, or secondary nodules may be found in remote organs, as the liver, spleen, and, rarely, the kidney. In papillary growths the peritoneum becomes infected, and through the peristaltic action may infect the entire abdomen. So extensive is the infection, and so prone to occur after the removal of these tumors, that it has been sometimes questioned whether papillary tumors did not belong to the malignant class. Their structure, formation, and the fact that they are not always absolutely fatal renders this improbable. The dermoid element has also been found implanted in the peritoneal cavity. Small tufts, covered with hair, have been noticed growing from the surface of the peritoneum of the intestine. A similar covering with colloid material has been found in multilocular cysts.

In a case operated upon by the writer some years ago the entire peritoneal cavity was studded with a thick colloid material which could not be entirely scraped off.

Other complications of ovarian cyst are—

1. *Ascites.*—A small amount of ascitic fluid may be present with many cysts, but a large quantity is rare so long as the tumor retains its normal condition. Changes in its structure, especially if of malignant character, are prone to an increase of free peritoneal fluid. Ascitic collections complicating ovarian cyst are said to be much richer in solids, containing from two to two and a quarter ounces, instead of six drachms. In malignant disease the fluid becomes darker, like prune-juice.

Large ascitic accumulations result from rupture of colloid or, particularly, of papillary cysts. Solid growths are generally attended with ascites. The presence of fluid in the peritoneal cavity is by no means an indication of malignancy, as it occurs in fibromata as well as in sarcomata and carcinomata. In the former, probably, it is due partly to the irritation of the peritoneal epithelium and partly to pressure upon the vessels.

2. *Intestinal obstruction or strangulation from pressure of the cyst* or adhesions to its surface, or torsion or volvulus from such adhesions takes place when the tumor has been reduced by puncture. The intestine may become occluded by extension of malignant disease.

Course, Duration, and Termination.—The rapidity of the growth of an ovarian tumor depends somewhat upon its character. Those of slow growth are usually cysts of the broad ligament, fibromatous tumors, and the fibro-myomata of the ovary. Proliferating cysts, whether glandular or papillary, grow more rapidly. The latter grow so rapidly that considerable increase in size may be noticed in ten days. The intra-ligamentary cysts of papillary origin are generally of slow growth. At the end of years they may not be larger than a child's head. Such patients suffer from profuse menstruation, due to the pressure upon the veins obstructing the return circulation. In the later stages ascites is developed, which rapidly returns after tapping. It is difficult to determine the duration of the disease where undisturbed. In 60 to 70 per cent. at least of the proliferating cystomata the patient dies within three years after the advent of the first symptoms, and another 10 per cent. die within four years. The slow-growing papillary cystomata generally cause the death of the patient from marasmus, but the average duration of the disease is longer than in the proliferating variety. Such a patient has been punctured one hundred and five times in seven years, with the removal of twenty-five to forty pounds of fluid at each operation. The proliferating cysts may remain unchanged even for years. Patients suffering with ovarian cysts may heal spontaneously or pass into a condition which is equivalent to recovery. Spontaneous recovery generally occurs from rupture of the cysts. This favorable result occurs more particularly in simple cysts, but rarely, if at all, in the proliferating.

Torsion of the pedicle, or axial rotation, may bring about recovery in colloid tumors. Such a termination, however, is rare, and the recovery is not absolute, as there usually can be found a mass in the former position of the tumor. Spontaneous recovery, indeed, is rare, even in unilocular cysts, and in the proliferating cystomata is never looked for. Unless such patients are subjected promptly to surgical treatment, death occurs in the majority of cases from exhaustion, as a result of anorexia, impaired digestion, sleeplessness, and interfered respiration and circulation. Patients may suffer from bed-sores or intercurrent disease, which may rapidly prove fatal. Death is occasioned in other cases from peritonitis after torsion of the pedicle, rupture, or metastasis upon the peritoneum. Other fatal conditions may be intestinal occlusion and embolism of the pulmonary artery. The presence of ascites in considerable quantity is generally an unfavorable omen. Another cause of fatal result may be suppuration from puncture. This result was formerly very frequent. The presence of ascites must be considered an unfavorable symptom when it is associated with papillary growths or rupture of a glandular tumor. A tumor which has not been long in existence and which undergoes sudden development, attended with rapid emaciation and cachexia, multiple adhesions, especially in the pelvis, and œdema of the lower limbs and the abdominal walls, with peritonitic complication, should indicate a malignant onset. In such cases the outlook for a successful operation is bad, although operation should be done wherever there is the least chance for success.

The PHYSICAL SIGNS of the patient are determined by inspection, palpation, percussion, and auscultation. In the examination of the patient she should be placed upon a bed or couch, the limbs drawn up, clothing loosened, all constricting bands removed, so that the abdomen can be thoroughly and completely exposed. It is well that the patient should have been previously directed to have the bowel and bladder emptied. After covering the lower extremities with a sheet, and bringing it over the lower part of the abdomen so as to avoid exposure of the genitalia, the abdomen is bared. The first general procedure in examination is that of inspection. By inspection we are enabled to determine the size of the growth, the height to which it rises from the abdomen, its position, whether symmetrical or one-sided, the smoothness of its outline, whether spherical or larger from side to side, the appearance of the skin, presenting the linea albicantes, darkened line down the centre—the linea nigra, and discolorations of the skin indicating the application of counter-irritants and the presence of pre-existing inflammatory troubles. An irregular nodular appearance of the tumor would indicate that if cystic it consisted of a number of cysts, causing irregularity of the surface. The dark line is generally considered a symptom of pregnancy, but when it occurs it is permanent in duration, so that it is only in the first pregnancy that it is of value. It should not be forgotten, however, that this increase of the local pigment occurs in women who suffer from ovarian cyst or uterine fibroids; the presence of linea albicantes has no significance as regards the question of pregnancy. They arise from any distension of the abdomen sufficient to cause rupture of the skin, and hence are found not only in pregnancy, but in ovarian cyst, ascites, and other conditions which are likely to cause abdominal enlargement, and may be entirely absent in women who have borne children.

Palpation is practised by placing the hand over the abdomen, in cold weather the hands having been previously warmed. The abdominal cavity is carefully explored, the condition of the various organs investigated, and any enlargement of the abdomen, presence of a cyst or tumor, can generally be readily recognized. Palpation is practised by placing the hands now upon opposite sides of the abdomen and then close together, going over one portion after another, so determining the size, consistency, resistance, and regularity of the growths, the presence of outgrowths or nodules, and the sensation of crepitation or of friction. Placing the hand upon one side and striking gently with the other will elicit fluctuation, particularly when we are dealing with a large unilocular cyst. In multilocular growths the fluctuation wave would be shorter or may be entirely absent.

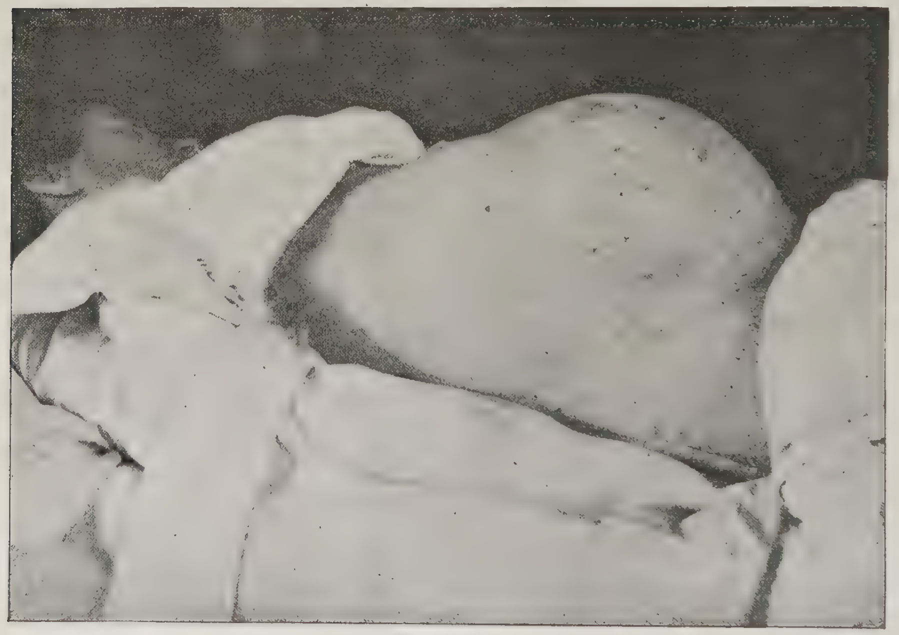
Percussion is of special value in determining the outline or extent of growths, their relation to the abdominal viscera, and their determination from other forms of abdominal distension. It affords an absolute means of differentiation of growths from distensions of the abdomen by free fluid or accumulations of gas.

Auscultation gives but slight information. It is of service in differential diagnosis, more particularly in its negative results.

Diagnosis.—The diagnosis of ovarian tumors may be divided into two divisions: first, the determination of such growths when small and situated in the pelvis; second, when large, filling the greater part of, or the entire, abdominal cavity.

The physical signs vary according to the size and position. In the former stage the tumor is entirely within the pelvis and its position varies. It may retain the normal situation, and as it increases in size may encroach upon the general abdominal cavity. Tumors when as large as a hen's egg, however, generally fall downward and backward into Douglas's pouch immediately behind the uterus. In rare cases they may be found in front or to one side. The ovary, but slightly enlarged, may retain its normal position. Its relation to the corresponding side of the uterus affords but little difficulty in determining its character by conjoined manipulation. Where its growth has been associated with peritonitic inflammation, it may be more difficult to determine its true character. Small tumors are usually firm to the feel, for the reason that they are too small to produce an elastic consistency. In a large tumor situated behind the uterus the diagnosis is determined by the circumscribed character of the growth. Elasticity is a valuable sign, which is generally absent in proliferating cystomata, and even in single cysts, and particularly dermoids, which afford a solid sensation to the touch. If we are unable to determine or separate the tumor from the uterus, and consequently to determine its pedunculation, this can be ascertained by Hegar's method, which consists in placing the patient upon her back, seizing the uterus by a pair of volsella forceps, and strongly dragging it down; at the same time we endeavor to feel the lateral borders of the uterus as far as the fundus

Fig. 346.



Distension of the Abdomen by an Ovarian Tumor.

with one or two fingers in the rectum, or we push the uterus downward and backward by means of the outer exploring hand, and thus outline its relations. When the tumor is not too large it can generally be outlined with the finger in the rectum and the hand over the abdomen. The greatest difficulty is experienced in those cases in which the tumor is adherent in the pelvis and surrounded by exudation or is incarcerated. Tumors which are situated entirely within the broad ligament, and formed unilaterally or bilaterally or in close apposition to the uterus, are less spherical and circumscribed, and less movable from the start. Small growths must be diagnosed from fibroids and tumors caused by disease of the tubes, particularly hydro-, pyo-, and hematosalpinx. The more acute history, marked tenderness, evidence of inflammatory exudation, thickening and matting together of the pelvic tissues, and increased pain, would eliminate pyosalpinx. In hydrosalpinx the tumor may be movable, present a sensation of elasticity or fluctuation, but it is oblong or gourd-shaped rather than spherical. It is closely attached to the uterus and presents a history of previous inflammation. Hematosalpinx is at first soft, and then becomes hard and dense from coagulation of the blood. It is situated to one side of the pelvis rather than posterior to the uterus.

Large or Abdominal Cysts.

In a woman suffering from a large ovarian cyst the abdomen will be found distended more particularly at its lower part, quite prominent, and rising abruptly from the pubes. As the patient lies upon her back with the abdomen exposed, it will be seen to be sharply and definitely outlined, and generally symmetrically developed; if any difference, a little more prominent on the right side. Palpation may determine its outline, extent, and size. If there is a large single cyst, the surface will be smooth and regular, while in multilocular cysts it may present projections and irregularities. If made up of a number of small cysts, it will present a much more marked resistance, although there is still a sensation of elasticity. The tumor may be moved from side to side or pushed upward and downward. Percussion discloses dullness over the entire surface of the tumor, with resonance above and possibly resonance in the flank upon one side. The resonance in this region is supposed to indicate that the tumor has developed from the opposite side or ovary, and as it increased in size has pushed the intestines upward and to the unaffected side. We cannot, however, with certainty determine in this way the ovary from which the tumor has arisen, as when the growth has increased in size it is likely to become prolapsed into Douglas's pouch and develop from there; consequently this does not afford a positive indication as to the source of origin.

Considering the conditions with which ovarian cyst may be confounded, it is well to begin with pregnancy, from its greater frequency and importance. *Vice versa,* it may seem unreasonable that pregnancy should be mistaken for an ovarian cyst, but there are a number of cases upon record in which the abdomen has been opened to find the distension caused by a pregnant uterus. In order to arrive at a correct diagnosis, we need to carefully analyze the symptoms of the two conditions. In this we consider the history of the case. In pregnancy the enlargement of the abdomen is more rapid, and is generally attended with suppression of the menstruation, the sympathetic symptoms, nausea, vomiting, disturbed appetite, with a healthy appearance of the individual. Suppression of menstruation is not a constant symptom of pregnancy, as there are women who continue to menstruate during the entire period of pregnancy. It may be associated with ovarian cyst, particularly where both ovaries are completely degenerated. Error is most likely to occur, in early pregnancy, in the unmarried. In these cases the physician should carefully avoid announcing a diagnosis until a careful examination has been made, and even then should not be too hasty. If there is any doubt, he should defer expressing an opinion, and have the patient undergo an examination a few weeks later. The changes which occur will generally be sufficient to enable him to express a definite opinion. In pregnancy there is generally an absence of fluctuation. The same symptom may be absent in ovarian cyst with thick viscid contents, or in the areolar or glandular varieties made up of a large number of small cysts. Later, fetal movements and parts of the fetus may be distinguished, and the fetal heart-sounds recognized. The latter symptom is one which is pathognomonic of pregnancy. Heart-sounds, however, are not always heard, owing to the position of the fetus and the large quantity of fluid or possible fetal death. Conjoined examination through the vagina or rectum should be a part of the procedure. By it we are enabled to determine the association of the abdominal distension with the increased size of the uterus. Gestation in one horn of a bicornate uterus may render diagnosis difficult. Careful examination by the vagina and rectum will show the association of the enlargement with the uterus, the other cornu possibly remaining small. Where there is the least suspicion of pregnancy the introduction of the uterine sound should be absolutely avoided.

Hydramnios.—Cases in which the liquor amnii exceeds two quarts have been mistaken for ovarian tumor. Large accumulations within the walls of the uterus give rise to fluctuation, the abdominal walls will be greatly distended, glistening, and the patient will suffer from all the discomfort arising from a marked abdominal distension from ascites or ovarian cyst. This condition generally comes on suddenly, and takes place about the sixth or seventh month of pregnancy, which prior to its occurrence has run a normal course. On examination the uterus will be found distended, possibly the cervix obliterated, the os open, covered with a dense membrane, and by manipulation we may be able to distinguish the symptom of ballottement; rupture of the membrane results in the discharge of a quantity of water and the emptying of the uterus. The existence of ovarian cyst of one or both ovaries does not necessarily indicate the non-existence of pregnancy, as so long as any ovarian stroma remains unaffected, ovulation and conception may occur. The increased quantity of blood that is sent into the pelvis during the development of pregnancy may increase the rapidity of development of an ovarian cyst. The enlargement of the abdomen may be so marked as to indicate the necessity for interference with the process in order to prolong the patient's life. Careful examination will disclose the enlarged uterus either in front of or behind the ovarian cyst. In some cases the ovarian cyst may be situated in the pelvis and obstruct the vagina, rendering it difficult to reach the cervix. In the later months of pregnancy such cysts may be tapped, enabling the individual to go over until the completion of gestation, or, if found early, ovariotomy may be performed. The existence of pregnancy does not seem to influence its mortality. Morbid collections within the uterus may be physo-, hydro-, or hematometra. Physometra is a collection of gases within the uterus, the result of decomposition, and is a very rare condition. Hydrometra is a collection of water in the organ, which is more likely to take place in women of advanced age, due to the retention of the secretions from obliteration of the canal. Hematometra may result from occlusion of the cervix or vagina, with retention of menstrual discharges.

It is more likely to occur near puberty. Examination by vagina or rectum is usually sufficient to demonstrate the cause. Other growths within the uterus which have led to difficulty in diagnosis are myomata or fibro-myomata. These growths are rare before the twenty-fifth year; indeed, not common before the thirtieth. They are more likely to be confounded with ovarian tumors on account of the very great size to which they attain, filling up the entire abdominal cavity and presenting a tumor larger than the pregnant uterus at full term. These growths are usually of slow development, irregular in outline, present a firm and marked resistance and the absence of fluctuation. They may cause no disturbance of the menstrual function, as in the subperitoneal fibroids, or marked menorrhagia in the submucous. Vaginal examination discloses the close association of the tumor with the uterus. Generally movement of the tumor will cause movement of the cervix. Where the tumor is but connected with the uterus by a long pedicle, it may be more difficult to determine its character. This may be accomplished by having the tumor, through the abdominal walls, drawn up by an assistant, while the cervix is drawn down by a volsellum in the hand of the examiner, who introduces the finger of the other hand into the rectum, and thus definitely determines the association of the mass with the uterus. If it can be entirely separated from that organ, it is evident the growth is ovarian. Auscultation usually discloses a blowing sound due to the coursing of blood through the large uterine sinuses—a condition which is absent in ovarian cysts. The conditions which are most difficult to determine are those in which a fibroid with long pedicle is œdematous, giving a sensation of elasticity, or an ovarian cyst with thick, viscid contents, or those cases of fibroid growth which have undergone cystic degeneration. The methods we have already mentioned of determining whether the growth is a part of the uterus may be exercised, and in cases of doubt it may be necessary to resort to exploratory incision.

Ascites.—There is generally little difficulty in arriving at a correct diagnosis in cases of uncomplicated ovarian cyst. Unilocular ovarian cysts, probably more frequently than any others, are confounded with ascites. It may be avoided by keeping in mind that in ascites, if the patient lies upon her back, the abdomen is likely to be flattened, broader from side to side—that there is less resistance, and upon palpation the abdominal wall can be depressed to a greater degree, displacing the free fluid. Upon percussion in ascites there is a zone of resonance at the summit of the distension, due to the intestines filled with gas floating to the surface, while there is dullness in the flank and over the sides. In ovarian cyst there is dullness over the surface of the distension, resonance above it and over one flank. In ascites the level of the fluid changes with the change of position, consequently the resonance changes; in ovarian cyst it is unchanged. Very marked abdominal distension may afford an element of uncertainty in the fact that the distension is so great that the mesentery is too short to permit the intestines to come in contact with the abdominal surface. In such cases depressing the abdominal walls, thus displacing the intervening layer of fluid, may afford resonance, while superficial percussion is dull. Owing to a communication with the intestines gas may pass into the ovarian cyst, causing resonance over its surface. In these cases we will have to depend upon the resistance of the cyst to determine its presence. In cases of ascites, also, the history will be of advantage, as affording information of renal, cardiac, and hepatic disease. In cases of inflammatory ascites or ascites from tubercular peritonitis the diagnosis may be difficult, and only determined by incision. Ascites may complicate an ovarian cyst; thus by depression a layer of fluid may be displaced, bringing the hand in contact with the tumor within. The amount of resistance will determine whether the tumor is solid or cystic. The presence of ascites is generally an indication of the malignancy of the growth. The more marked the ascites, the greater the probability of malignancy. The only exception to this rule is in fibroids of the ovary which may give rise to an ascites, probably from irritation of the peritoneum or obstruction to the return circulation. The uterus will be found freely movable in ascites, while in ovarian cysts it will be displaced either downward and backward or upward and forward. In ascites from papillary cysts the uterus presents on either side a dense thickened mass which should cause a suspicion of its true character.

Phantom Tumor.—Phantom tumor is a condition in which there is an apparent tumor due to distension by gas. This may in some cases attain to considerable size, and when associated with the illusion of supposed pregnancy is known as pseudo-cyesis. It is more likely to occur in nervous sterile women. The form just spoken of occurs in cases of illicit intercourse, or in young individuals in whom there is a fear of pregnancy, or in older in whom there is a morbid desire to have children. Such patients will experience the fetal movements and all the ordinary sensations of pregnancy. It is likely to occur at or near the climacteric, and is generally associated with a large increase of adipose tissue. Percussion over the abdomen is sufficient to disclose the fact that the apparent tumor is filled with gas. Palpation will generally elicit the absence of any tumor, or, if the swelling or distension remains permanent under pressure, it may be entirely removed by placing the patient under the influence of an anesthetic.

UTERINE MYOMATA COMPLICATING OVARIAN CYST.

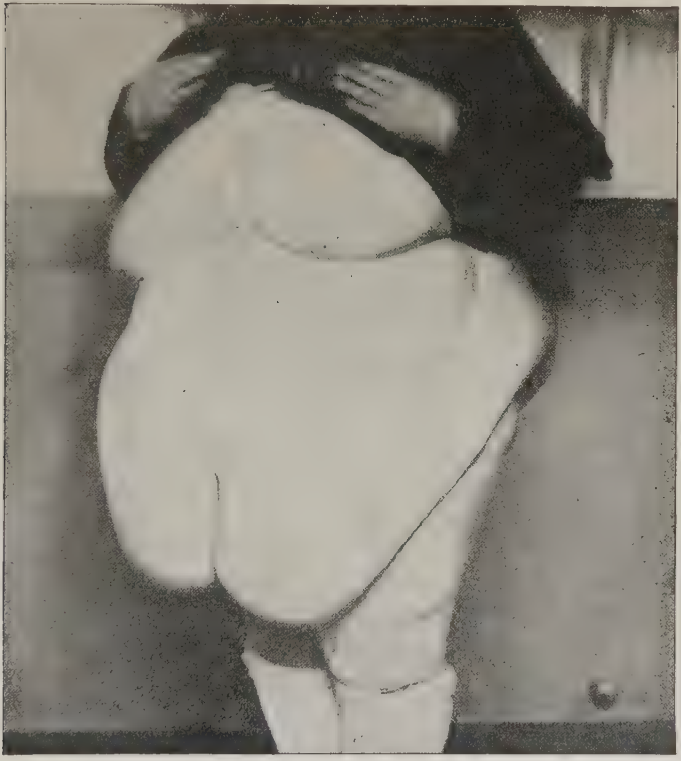
The presence of a cyst of the ovary and a fibroid tumor of the uterus in the same patient is not infrequent. Where the ovarian cyst is large and situated in front of the uterine tumor, the diagnosis may be difficult, and only determined after puncture of the cyst or abdominal section. The author recently made a diagnosis of this condition in a patient with the following history: A woman æt. 33 years, married, had been suffering with abdominal enlargement for nearly a year, which for the last four months had increased more rapidly. She had been suffering from irregular hemorrhage; was pale and emaciated; she complained of severe pain over the abdomen, increased by exertion. The abdomen was distended about the size of a six months' pregnancy; upon the right side, a little below the level of the umbilicus, was a hard, firm growth, apparently closely associated with a tumor upon the left side which extended above the umbilicus. The left tumor was more elastic and apparently contained fluid. Moving the mass upon the right caused the cervix to move, while movement of the left tumor apparently had no influence upon it. The diagnosis was, right side, myoma; left side, probably ovarian cyst made up of small cysts. Upon preparation for operation she was found to present a softened, dilated cervix, a bloody discharge, and within the uterus a fetus which gave evidence of having been two weeks dead.

Obesity.—A large pendulous abdomen from accumulation of fat within its walls or fat in the omentum may be mistaken for an ovarian cyst. The history of development, the general distribution of adipose over other parts of the body, while with ovarian cysts there is loss of adipose or emaciation, affords the diagnosis. The thickness of the abdominal walls may be estimated by pinching up a fold of the skin and subcutaneous tissue.

Ventral Hernia.—In two cases the author has been called to see patients suffering from supposed ovarian cysts, when the condition was due to separation of the recti muscles and protrusion of the intestines covered only by skin and peritoneum. Palpation of the intestinal coils and resonant percussion should have excluded the diagnosis of a cyst.

Desmoid Tumors.—These tumors originate in the fascia or deeper layers of the muscles. They are firm and resisting, are movable within the abdominal walls, above the surface of which they project to a marked degree. Marginal or rectal examination aids in excluding them from a pelvic origin.

Fig. 347.



Fatty Abdominal Wall, Simulating Ovarian Cyst.

Tympanitis.—Abdominal distension, as in phantom tumors, whether local or general, is characterized by resonance. The latter is associated with symptoms of inflammation; the former occurs in nervous, hysterical individuals.

Fecal Tumors.—An accumulation of feces is sometimes called a fecal tumor. It generally takes place in the colon. If it occurs in the transverse colon, that organ may be displaced downward by its weight, and rest over the lower part of the abdomen. Such accumulations are sometimes quite extensive. They are distinguished, however, by the length of the tumor, the peculiar sensation to the touch, the fact that it retains the imprint of the finger, and that it is entirely removed by free purgation and copious enemata.

Distended Bladder.—An over-distended bladder forms a tumor in the lower part of the abdomen, which fluctuates, is sensitive to pressure, and may be mistaken for a cyst. The precaution should always be taken to empty the bladder as a preliminary step to examination. It will of course thus be eliminated. In cases of pregnancy or fibroid tumor impacted in the pelvis, or even in impacted ovarian cysts, we may have retention resulting, and difficulty in the introduction of a catheter. In such cases it may be necessary to use a male catheter.

Cystic tumors, which may be mistaken for those of the ovary, are hydatid cysts of the liver and spleen, and cysts of the omentum, mesentery, pancreas, and kidney. Instead of cysts of the kidney, we may have the entire structure of the organ dilated, giving rise to a hydro- or a pyo-nephrosis. Hepatic cysts or dilatations of the gall-bladder are only mistaken for ovarian cysts when they are very large, filling up the abdominal cavity or by their weight dragging down toward the pelvis. When small they are found situated in the upper part of the abdomen to the right side. The diagnosis is usually determined by the percussion resonance being situated to the opposite side and the lower part of the abdomen, while there is dullness above. On vaginal examination the position of the uterus will be disclosed; also possibly the ovaries enlarged on either side of it may be recognized. In the hydatid cyst crepitation elicited by placing the hand over the cyst, and making pressure, will aid in determining its character. This is still further confirmed by finding upon microscopical examination of some of the fluid withdrawn for that purpose, hooklets and spurs of the echinococci. Tumors of the spleen are situated on the right side of the abdomen, and extend downward toward the pelvis, not infrequently enlarging across the abdomen. Mesenteric and omental cysts attain a considerable size, and often present great difficulties in diagnosis. Manipulation may, however, disclose the absence of attachment to the pelvic organs, and in this way afford a suspicion of their true character. The mesenteric cysts usually develop behind the peritoneum, and are consequently retro-peritoneal cysts. They may be situated to one side of the abdomen or in the median line, and usually do not dip down into the pelvis. Fluctuation is indistinct, and may be associated with resonance from the overlying intestine. Renal cysts in their origin develop from one side of the abdomen, are usually more or less fixed, and, increasing in size, may be pushed or displaced downward, in some cases occupying the anterior surface of the sacrum. An important aid in the diagnosis of these tumors is their mobility. Retro-peritoneal cysts sometimes develop in the pelvis, filling it up and rising upward into the abdominal cavity. Such tumors will usually be found closely associated with the uterus and difficult to separate from it; the uterus will be lifted up by them, the fundus felt in front of the tumor, above the symphysis; there will be a displacement generally of the rectum more to the left side, or it may run over the anterior surface of the tumor. These tumors are more or less resisting, presenting a sensation of elasticity rather than fluctuation. They generally are rapid in growth and of malignant character, more particularly the sarcomatous variety.

Where our examination satisfies us that we have to deal with an ovarian cyst, it still becomes a question of considerable importance to determine its character, whether single, multilocular, or dermoid. Multilocular cysts are usually of more rapid growth. They present a sensation of greater resistance than the unilocular, with a less distended wave of fluctuation. In the unilocular cyst the wave of fluctuation can be distinctly felt from one side of the abdomen to the other. In the multilocular, as the cyst is divided up into a number of smaller cysts, the wave of fluctuation must necessarily be shorter, and if the cysts are sufficiently small no fluctuation will be distinguished. These cases are sometimes exceedingly difficult to determine from the œdematous fibroid, and it is only by careful manual examination, by which the association of the latter with the uterus is determined, that we are able to arrive at a diagnosis, and in some cases only an abdominal incision will afford us a correct knowledge.

A case came under observation a year ago in which to the right of the cervix was found a mass, somewhat hard and resisting, which was felt to be continuous with the cervix. Above this was a considerably larger mass, soft and elastic, and between this and what we had supposed to be the entire uterus was tissue into which the fingers could be pressed. This apparently indicated that the tumor had grown from the broad ligament and was closely associated with the uterus. The diagnosis was a probable intra-ligamentary ovarian cyst. Upon opening the abdomen the mass which we had supposed to be an œdematous fibroid. The mass to the right, which was firm, was a second fibroid in a more mature condition, and the soft line between them was the junction of the fibroid with the body of the uterus.

Dermoids are distinguished by their slow growth, greater mobility, sensation of resistance, and absence of fluctuation.

Adhesions.—Adhesions may be expected where a tumor has attained to very great size: under the pressure, the tumor suffers a loss of the endothelial layer of its covering peritoneum, roughening of its surface follows, with a tendency to a slight peritonitis and the formation of adhesions. These are more likely to take place over the anterior surface of the tumor, and next in frequency between it and the omentum. The history of repeated attacks of peritonitis during the progress of the growth will almost certainly indicate extensive adhesions. They will occur also in inflammatory conditions of the cyst itself, whether resulting from torsion of its pedicle or from suppuration or gangrene. The mobility of the tumor or the ease with which the abdominal walls can be moved over it leads us to hope that adhesions are slight, though we cannot determine absolutely that it is free from them.

Pedicle.—The enlargement of the ovary leads to its prolapse when by dragging upon its connection with the broad ligament it becomes more or less pedunculated. This elongation of its neck becomes increased when the tumor is large enough to rest in part upon the brim of the pelvis. The neck or attachment is known as the pedicle. It is composed in most cases of a part of the broad and ovarian ligaments, and generally contains the Fallopian tube. The thickness and length of the pedicle can only be determined with certainty at the time of removal. Where the tumor is freely movable it is reasonable to suppose that we have to deal with a long pedicle. Then by raising the tumor up and with the finger in the vagina, or, better, in the rectum, we may be able to feel the connection between the tumor and the uterine appendage.

Exploratory Puncture.—In obscure and complicated cases the diagnosis may be rendered so difficult that in times past it has been deemed desirable to determine the character of the tumor and its contents before deciding as to what operative procedure to adopt. To accomplish this, the removal and examination—chemical and microscopical—of a portion of the cyst-contents has been recommended.

It should be remembered that the operation of aspiration of a cyst is not unattended with danger, as the intestines and bladder have been frequently punctured. There may be an escape of fluid into the peritoneal cavity or the entrance of air into the tumor, and the latter may be followed by gangrene or suppuration. A large vessel in the tumor-wall may be injured by the introduction of the aspirator, and an extensive hemorrhage result. In view of these dangers tapping is rarely justifiable.

A proliferating cyst usually furnishes fluid of a thick, colloid character, with a specific gravity of 1015–1030, which contains paralbumen and cylindrical epithelial cells. In the papillary cysts there is an absence of paralbumen, while the microscope discloses white blood-corpuscles. The fluid from the Graafian follicles is not distinguishable from that obtained from parovarian cysts. Ascitic fluid is thin, light yellow or greenish-colored, deposits albumen on boiling, does not contain cylindrical epithelium, and has a specific gravity of 1008–1015. In the cysto-fibromata the fluid has a lemon-yellow color, with a specific gravity of 1020, coagulates rapidly without heat, and does not contain cylindrical epithelium. The fluid from echinococcus cysts is distinguished by the hooklets, and has a specific gravity of 1008–1010, without albumen. In hydronephrosis the fluid is thin, with a specific gravity of 1005–1018, varies in color, and contains urea, leucine, tyrosine, and kreatinine. Puncture in an ovarian cyst is always dangerous, and when performed for diagnosis in doubtful cases, as in echinococcus cysts, renal tumors, abscesses, or dermoids, it may be attended with the most serious consequences. The exploratory incision is a far less dangerous procedure. In cases in which it is impossible to arrive at a correct diagnosis, as in ascites from tubercular peritonitis or malignant disease of the ovary, tube, or omentum, or from papillary cysts, the buttonhole incision, through which one finger can be introduced, is far the preferable procedure, and, while admitting opportunity for the determination of the condition by touch, affords a subsequent opportunity for drainage.

Treatment.—As the fluid is contained within a closed sac which has its own secreting surface, the administration of remedies or the use of counter-irritants for the purpose of decreasing the accumulation by increased secretion and elimination is without reason. Electrolysis has been advocated, but when we consider the character of such growths and the danger of infection from many of them, it is too dangerous a plan to be considered. Surgical treatment consists of extirpation. Puncture is at best only a palliative measure, as the removal of the fluid is quickly followed by its re-accumulation, and is attended with great loss of albumen. The first puncture would necessarily be followed by others at shorter intervals, until the patient becomes exhausted by the severe drain. As has already been mentioned, it is attended with danger from the direct loss of blood, as the opening of a vessel, presence of papillary cysts, and rupture of a thin-walled cyst and the spreading of its papillary contents to the peritoneal cavity, as well as from septic infection. The operation may be done in pregnancy in the later stages in preference to ovariotomy as a temporary expedient, where the cyst is situated in the pelvis and would interfere with the delivery of the patient. Under these conditions the puncture should be made through the vagina.

This is an exceedingly dangerous procedure, however, as the vaginal canal is difficult to render thoroughly aseptic. Puncturing the cyst through the rectum is under all circumstances absolutely unjustifiable.

Ovariotomy.—The only treatment that is applicable to all cases and is worthy of consideration is the extirpation of the tumor, or ovariotomy. Success in the performance of this operation will depend very much upon the care with which the diagnosis has been made, the knowledge of the operator concerning the condition of the patient, the dexterity with which the operation is performed, or the readiness in meeting complications, and the judicious treatment of patients subsequent to its performance. Preparation for the operation will be considered, first, in the preparation of the patient; second, of the room; third, of the instruments and dressings; fourth, of the operator and his assistants.

The patient should have been carefully examined, and should be free from any febrile condition, or, if such is present, its cause should be ascertained. Operation should be avoided in the presence of bronchial catarrh or inflammatory diseases of the lungs or other organs, unless absolutely necessary. The individual character of the pulse should be determined, the urine carefully examined, and laxatives administered for two nights preceding the day set for the operation, a few hours before which the rectum is emptied by enema. The patient should have been thoroughly bathed with hot water and soap each night for two or three nights, especial attention being given to the cleansing of the abdomen, pit of the umbilicus, and the external genitalia. The genitalia should be thoroughly shaved, and again washed with soap and water, followed by a bath of bichloride-of-mercury solution, and a vaginal injection of bichloride-of-mercury solution 1 : 2000, given the morning before the operation. The abdominal walls should be covered with a pad wet with a bichloride-of-mercury solution, held in place by a binder, for at least two hours before the time for operation. After the patient is placed upon the table, the abdomen should be thoroughly scrubbed by a towel wet with alcohol until the surface is reddened. She should be kept in bed for forty-eight hours prior to the operation, and be given food which produces little flatulence; no solid food should be taken on the night preceding or on the morning of the operation. Owing to the large percentage of casein and its tendency to produce flatulence, milk should not be considered a proper diet either before or immediately following the operation. Before the patient goes to the operating table it is preferable to have the urine voided. If there is any doubt about this being complete, the catheter should be used.

Preparation of the Room.—The room if in a private residence and obtainable should be large, light, and well ventilated. The temperature should be about 75° F. It should be freed from all superfluous furniture, as carpets and hangings. The floor and woodwork should have been thoroughly scrubbed with soap and hot water, and the walls wiped down with a damp cloth. The operating table should be of convenient height, and may consist, if other means are not at hand, of an ordinary kitchen table or of two kitchen tables placed at right angles to one another. It should be placed with the foot of the patient toward the window, so that the light may fall into the abdomen, and should be covered with a couple of blankets, over these a rubber cloth, and over this a sheet. There should be at hand three smaller tables—one for sponges, a second for instruments, and a third for the dressings.

Instruments.—The operator should aim to have just as few instruments prepared as is necessary to perform the operation, but, as it cannot always be determined beforehand in any individual case whether the operation will be a simple or a complicated one, it is well to have a second tray at hand with instruments that might possibly be needed. In the tray of necessary instruments should be placed a scalpel; curved scissors; dissecting forceps; six small hemostats; two large or pedicle forceps; an ovarian trocar; suture-carrier; needle-holder; half a dozen needles, straight and curved. In the second tray may be placed retractors, hemostats, pedicle forceps, and conveniently at hand, for use if necessary, there should be a Paquelin cautery.

Sponges.—A definite number of sponges must be selected, about half a dozen in all—four small and two elephant ear. These should have been most carefully prepared as described in the consideration of Technique. The ligature and suture material consists either of catgut, silk, or silkworm-gut. Instead of sponges, gauze pads may be used: these are about eight to twelve inches square, made by folding gauze until it forms eight layers, turning the raw edges in, and hemming so that there is no opportunity for threads to be left in the abdominal cavity. These pads should then be boiled in water to remove the sizing, carefully washed and placed in a 5 per cent. solution of carbolic acid. They are not as satisfactory for thoroughly drying the abdominal cavity as are sponges. In addition there should be at hand for every operation, ether or chloroform as is preferred for anesthesia; strychnine in solution, or in tablets of one-twentieth or one-thirtieth of a grain; nitrate of amyl and nitro-glycerin, atropine one-eightieth of a grain, and Monsel's solution. The instruments should be placed in trays on a table to the right of the operator, where he can reach them without the aid of an assistant.

The patient, after the administration of the anesthetic, is placed upon the table, having the lower extremities covered with a clean blanket, over which a sterilized sheet is spread. The clothing is drawn well up under the arms, front and back, and the upper part of the body covered with a sterilized blanket; over this are placed sterilized towels, one above, one below and one on either side, fastened by safety-pins. These pins should be placed under the towel or the towel may be laid on the abdomen, pinned about an inch and a half or two inches from its border, and then turned back toward the side on which it is placed; the opposite side may be prepared in a similar manner. In this way the safety-pins are covered and out of the way. The whole is covered over by a large piece of sterilized gauze with a slit cut in it corresponding with the site of the abdominal incision.

After cleaning the hands, the operators and assistants must exercise the greatest watchfulness and care not subsequently to touch any non-sterilized object. If by chance the hands should be touched or come in contact with anything that has not been cleansed, the operator or assistant should discontinue the operation until he can re-sterilize his hands. A basin of hot water should be placed on the table alongside of him, with directions to the nurse that it shall be changed from time to time. In this the hands should be washed whenever soiled with blood or pus during the progress of the operation. The assistants should consist of an anesthetizer, who must devote himself most carefully to the patient, watching the pulse and respiration, and under no circumstances failing to note changes in her condition. A principal assistant should stand opposite the operator to the right of the patient. Behind him, within easy reach, is a table with two basins for the sponges, in one of which they are kept in clean water until needed. As they become soiled they are thrown into the second basin, where after being washed out by the nurse they are placed in the former one. It is well to divide the sponges into two lots, having one lot in a reserve basin to be used in case the first becomes soiled. The nurse in charge of the sponges must, under no circumstances, fail to keep a record of the number in use, and should be able at any time to state their location. If a sponge falls upon the floor or comes in contact with any septic object, it should not again be used, but its position should be remembered, so that in enumerating them at the close of the operation there will be no possibility of mistake. This is a very important direction, as numbers of cases are upon record in the experience of skillful operators where through negligence sponges or other articles have been left within the abdominal cavity, leading either to the death of the patient or to the necessity of reopening the wound in order to remove them.

With a nurse in charge of the sponges, a fourth assistant is desirable, to be ready for emergencies: he may look after the threading of needles, preparation of sutures, and the Paquelin cautery. In the great majority of cases the patient will be placed under the influence of ether for the operation. In those cases, however, in which examination has disclosed either a defective condition of the kidneys or the presence of albumen, chloroform is the safer anesthetic. In the administration of chloroform it is important that it should be given carefully, securing with it a sufficient quantity of air. It is well to use a napkin, handkerchief, or several layers of gauze, dropping the chloroform upon this, allowing a sufficient amount of air to be inspired with it to render its use safe. In the administration of ether, the pure vapor, unadulterated with air should be given. In some patients the ether acts slowly and leads to considerable struggling. This may be avoided by the previous administration of bromide of ethyl, which acts very quickly and with scarcely any excitement. The anesthesia with ether may be commenced while the patient is under its influence, or a hypodermic injection of morphia, a sixth or a quarter of a grain may be administered one-half hour before the anesthesia. Having a patient anesthetized and placed upon the table, surrounded with sterilized blankets and towels, and the abdomen cleansed, we are ready for the operation.

Operation.—In considering the conduct of the operation we prefer to divide it into different steps or stages and describe the method of procedure in each. By so doing we feel that we can impress upon the would-be operator a graphic outline of the various accidents which may occur and the subterfuges to which he may resort as he proceeds. We do not feel that he can deviate from a safe course in completing the entire journey if an accurate chart of each portion is presented. The different steps are:

1. Incision of the abdominal wall;
2. Puncture, emptying, and removal of the cyst;
3. Management of adhesions;
4. Management of the pedicle;
5. Toilet of the peritoneum;
6. Drainage;
7. Closing of the wound;
8. Dressing.

A description of the abdominal incision will be found elsewhere.

After incision of the peritoneum, the pearly, glistening surface of the cyst is exposed. The peritoneum should be held up, and the first incision in it carefully made to avoid injuring the cyst or coils of intestines. If there are adhesions the finger should be introduced through the small opening of the peritoneum and the incision extended by the use of probe-pointed scissors. The introduction of the finger guards against injury of the intestine or cyst. At the lower part of the wound it discovers the bladder and prevents its being wounded. The peritoneum may be overlooked and cut through, and the omentum mistaken for preperitoneal fat; in the latter the vessels are transverse, in the former vertical. Where the peritoneum is firmly fastened to the parietes of the cyst it may be difficult to determine when it is reached. The cyst-wall should be incised, the cysts emptied, and an attempt made to withdraw the posterior wall, or the incision in the abdomen may be carried up to the umbilicus, where the layers of the abdominal wall become fused together, when the cyst-wall will be more easily recognized. After the peritoneum is incised, as a preliminary step to further procedure it should be fastened to the integument by one suture about the middle of either side of the wound. This prevents it being pushed off from the abdominal walls during the further manipulation.

Emptying the Cyst.—The cyst projects into the wound, presenting a pearly, glistening appearance. The trocar, with a rubber tube attached, long enough to dip into a receptacle placed beneath the table, is then plunged into the cyst, choosing a point for its introduction which will empty the large or main cyst and is free from large vessels. This puncture should not be made at the lower angle of the wound, for the reason that as the cyst empties it retracts and leaves the opening situated below the wound, increasing the difficulty of preventing the fluid from flowing into the abdomen. As the trocar is plunged into the cyst the abdominal walls are held close about it, and sponges should be packed around the orifice to prevent any fluid running back into the peritoneal cavity. As the sac becomes relaxed it is grasped with hemostats, and later with cyst forceps, and drawn out, keeping the opening in the cyst outside the abdominal wound. The assistant will place his hands upon either side of the abdomen or above it, making pressure, which forces out the fluid and keeps the wound stretched over the projecting surface of the cyst. If there are a number of cysts, the trocar may be passed from one into the other. In this procedure, however, it is important that the hand should be passed into the abdomen around the cyst to prevent the trocar from perforating its main wall, injuring the viscera or abdominal tissues, or permitting the escape of fluid. Where a trocar of suitable character is not at hand, the parts may be drawn tense around the cyst, puncture made into it with a knife, the edges grasped with forceps, drawn out, and the orifice thus kept outside the abdominal cavity. Other cysts may be opened through the first cyst, and their cavities broken down by the hand passed through the opening. This, in some cases, may be necessary, owing to the consistency of the fluid being such that it will not readily flow through the trocar. In small cysts it is preferable to introduce the hand and break up the cysts rather than to attempt to pass the trocar in different directions to empty them. As the cyst is emptied it is also drawn out, so that in a single cyst, or in a multilocular cyst which is not adherent, the emptying is followed or partially preceded by the withdrawal of the sac. Where the cyst has thick, viscid contents, it may be necessary to draw it well up into the wound before opening it, or possibly, after turning the patient upon her side, to press back the abdominal wall from the under side, open the cyst, and, dragging the opening still farther out, break up the contents. In this way a cyst of considerable size may be brought through a small opening. Where there is considerable solid material in the cyst, however, requiring some difficulty to bring it through the opening, the latter should be enlarged, rather than to subject the patient to much manipulation in order to avoid a large opening. In dermoid cysts or those in which suppuration has occurred it is better that a larger opening should be made and the cysts removed entire. When the contents of dermoid cysts flow into the abdominal cavity it is exceedingly difficult to remove them and to neutralize their irritating effect. The material is oily in character, and does not wash out readily by irrigation; for such reasons it is preferable that the cyst should be removed intact.

Adhesions.—The ease with which adhesions may be managed depends much upon their character. In recent cases, where the cyst has undergone inflammatory action, resulting in adhesive peritonitis, the adhesions may be readily overcome by the use of the sponge. It is sometimes recommended to introduce the hand into the abdominal cavity before the cyst is punctured and separate or break up the adhesions. This can readily be done over the anterior parietes, where the adhesions are soft, but dense, firm adhesions should preferably be separated at the wound under the guidance of the eye. Consequently, after the cyst has been wholly or partially emptied, it is drawn out, and where adhesions of a soft and friable character exist, these are separated by pressing the viscera off from the sac by a sponge. Adhesions will depend in gravity upon their situation and duration. The older the adhesions, the more thoroughly organized they become and the more difficult they are to separate, requiring, in some cases, the use of the scissors or knife. Parietal adhesions, where they cannot be sponged off, may be separated by the finger, tearing the surfaces from the cyst-wall, or, where this cannot be accomplished, by using the scissors. Not infrequently considerable bleeding will take place. Omental adhesions are frequently long and quite vascular, so that they are preferably tied with double ligature and cut between, using for this purpose prepared catgut. Adhesions that are difficult to manage are those between the intestine and other abdominal viscera and the cyst-wall. Such adhesions may take place between the coils of the intestine, the stomach, the spleen, the liver, and the gall-bladder. Adhesions to some of these organs are exceedingly firm and only separated with considerable difficulty. Where the adhesions are long they may be separated by means of the scissors or by grasping the adhesions with a clamp and burning through the tissues with the cautery. When the adhesions to the intestine, for instance, are sessile, the removal of the neoplasm may be attended with considerable difficulty. In some cases adhesions are very close, and their removal would involve the structure of the bowel, impairing its vitality. It is then preferable that the cyst-wall should be cut through, leaving a portion of it attached to the intestine, taking the precaution to remove the epithelial lining membrane, thus taking away the entire secreting surface of the cyst. Pelvic adhesions of long duration are the most difficult to manage and the most dangerous in character. A tumor which has been situated low down in the pelvis, filling it, may be adherent to the large arterial or venous vessels. The author never had a more trying or sadder experience than in a woman of sixty-three years of age, the mother of a physician, who had a thin-walled cyst, which was completely emptied, and was only adherent in the pelvis. On making gentle traction upon the cyst, endeavoring to push off the pelvic tissues, there was at once a sudden filling up of the entire pelvis with venous blood, showing that a large vein had been injured. The hemorrhage was controlled by packing the pelvis with sponges, removing the blood, but the patient was already profoundly shocked. After the removal of the sponges the pelvis was packed with iodoform gauze, which was brought out at the lower angle of the wound. She lived but a few hours after the completion of the operation.

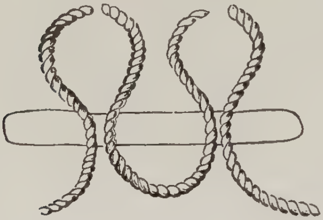
In some cases the adhesions will be found extending down into Douglas's cul-de-sac, requiring an universal enucleation. In parovarian or broad-ligament cysts we may find the broad ligament spread out and covering the cyst-wall. In such cases it is important to examine carefully the tissues as we progress, for the tumor may be found to have begun its development deep in the broad ligament, and may have pushed above it the ureter, as was found by the author in one case of broad-ligament cyst: after opening the cyst and commencing to enucleate, the ureter was found to pass directly over it. Attempted enucleation would have been attended with so much injury to the ureter as to have imperiled its vitality. For this reason the tumor was completely emptied, washed out, and, with a view of securing drainage, stitched to the abdominal wound and its cavity packed with iodoform gauze, in order to set up inflammatory changes within it to destroy its secreting surface and lead to adhesion of its walls. In this, however, we regret to say, the operation was not a success, as the patient appeared a few months later having a cyst fully as large as the one for which we had operated.

Papillary cysts may develop beneath the broad ligament, and infiltrate the tissues to such a degree as would render their removal almost impossible, or, if removal were performed, would leave a large, ragged, raw surface which necessarily increases the danger to the patient. In bleeding following the separation of extensive adhesions, not arrested by irrigation with hot water, it may be necessary to resort to either the use of Monsel's solution, wetting a sponge with 1 : 4 of the solution and wiping it over the oozing surface, or the use of the Paquelin cautery. Where the adhesions have been to the anterior parietes in very large cysts, large raw surfaces are exposed; that is, the peritoneum is torn through. The bleeding may be controlled and unfortunate intestinal adhesions avoided by introducing sutures through the abdominal wall in such a way as to approximate the large raw surfaces and thus shut them out of the abdominal cavity and promote their union.

Pedicle.—After emptying the cyst and drawing it out, the empty sac is found to be attached to the abdominal cavity by a more or less narrow band of tissue which is known as the pedicle. It consists in the majority of cases of the ovarian ligament, a part of the broad ligament, with not infrequently the tube extending up over the cyst. There has been much discussion in the past upon the proper treatment of the pedicle—whether it should be treated intra- or extra-peritoneally; in other words, whether it should be ligated or the vessels otherwise secured and dropped back, or should be brought back and fastened in the lower angle of the wound. In the latter method of treatment it has been the custom to use the clamp. This clamp method for many years was practised by Atlee, Wells, and contemporary operators. Its advantage was the security against hemorrhage and the fact that the pedicle was constantly under observation. It had the disadvantage of requiring a longer time for convalescence; the pedicle sloughed off, increasing the danger of septic infection, leaving a surface to heal by granulation, and in some cases has resulted in subsequent menstruation from the stump. The intra-peritoneal method is that which is now universally practised. The pedicle may be ligated or cauterized, as has been recommended by Keith. Cauterization is performed by grasping the tissue of the pedicle in a clamp, one side of which is covered with ivory plates to prevent the heat being conveyed to the tissues beneath, and searing the included tissues by cautery iron heated to redness. The method is dangerous, and not to be used under any circumstances where it is possible to place a ligature. Operators universally prefer the use of the ligature. The pedicle, when of ordinary size, is transfixed and tied in two portions. The ligament should be transfixed with a double ligature, cut, and each half tied separately and then both the ends together, or one ligature may be carried around, tying it over both parts. Where we have a large tumor made up of solid material, which it would require considerable effort to hold and prevent traction upon the pedicle, the latter may be seized with pedicle forceps immediately beneath the cyst, to secure the patient from loss of blood, and the tumor cut away, after which the pedicle may be tied in the manner we have already described. In removing the tumor it is important to leave a sufficiently long stump above the ligature to prevent the possibility of a portion of the tissue being retracted, permitting hemorrhage to take place from either the ovarian or uterine arteries. For ligation of the pedicle either silk or catgut may be used. The catgut is preferred by some operators for the reason that it, being an animal ligature, is absorbable and will not remain to give rise to irritation subsequently. Its disadvantages are that the ligature may slip, affording an opportunity for hemorrhage to occur after the wound has been closed, and the catgut being septic may cause infection of the peritoneal cavity.

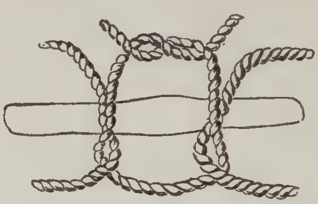
Where the pedicle is a broad one and a short stump is left above the ligature, it is preferable to introduce a second one, including that portion of the pedicle through which the ovarian artery passes, so that in case the ligature should slip this large vessel would still be controlled. An illustration of this procedure is given under the heading of Pelvic Inflammations. A broad, fleshy pedicle should preferably be tied in a number of sections, the ligatures being introduced and tied as seen in the accompanying figures. After the removal of a cyst and ligation of the pedicle the operator should examine the condition of the other ovary, and should it show signs of cyst-growth it is also to be removed. In some tumors, particularly the broad-ligament cysts and parovarian cysts, no pedicle will be found. These tumors dip down into the broad ligament alongside of the uterus. In such cases it will be necessary to peel out the cyst, and ligate any vessels that may be found to bleed, or, if the bleeding be from a large surface rather than from distended vessels, it may be controlled by gauze packing.

Fig. 348.



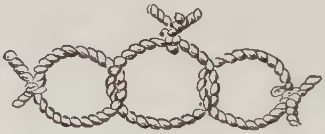
Triple Interlocking Ligature; the threads inserted.

Fig. 349.



Triple Interlocking Ligature; the threads interlocked ready for tying.

Fig. 350.



Triple Interlocking Ligature tied.

Peritoneal Toilet.—Where a simple uncomplicated cyst has been removed the necessary toilet of the peritoneum is slight. It consists in sponging out the cavity or in introducing a sponge to ascertain that there is no sign of bleeding, when the cavity may be closed. Where adhesions have been extensive, it is important to examine carefully to see whether or not bleeding still continues, and if so, to take measures to control the hemorrhage. If the omentum has been torn off from the cyst and shows signs of bleeding, it should be turned up over a towel wrung out of hot water, carefully examined, and bleeding points ligated with catgut. All bands of adhesion or openings in the omentum should be tied and cut away, as they only afford an opportunity for a knuckle of intestine to slip through and thus endanger the patient from obstruction of the bowel in the subsequent convalescence. Where there has been much bleeding and the abdominal cavity has been soiled with discharges from multilocular or papillary cysts, it should be thoroughly irrigated. The preferable fluid for this purpose is a 0.6 per cent. solution of common salt, of which, if necessary, several gallons may be used. It may be poured into the abdominal cavity from a pitcher, or through a funnel with a rubber tube attached, having a metallic end long enough to pass into Douglas's pouch; the water should be permitted to flow in until it runs out clear. After irrigation the superfluous fluid may be sponged out, or if the drainage-tube is used it may be left. A flat sponge is placed beneath the wound, over the intestines, in such a way as to cover them and keep them back while the sutures are introduced. The sutures, which are preferably of silkworm-gut, may be introduced in a single row, carrying each one through all the tissues including the peritoneum, exercising care in their introduction that the aponeurosis shall be drawn well forward over the recti muscles when they are tied. Preferably a separate row should be passed through the aponeurosis.

Before closing the wound we must consider the subject of drainage. When shall drainage be used? If used, what shall be its character? What shall be the method by which it will be accomplished? The question of drainage is one which has been much discussed of late years, some operators advocating that every case should be drained, others none. Its true place lies between these extremes. Every case in which extensive adhesions have been separated should be subjected to drainage. Those cases also in which there has been soiling of the peritoneal cavity by the contents of dermoid cysts or suppurating cysts should be given thorough and careful irrigation and subsequent drainage.

As to the form of drainage: a glass tube, as illustrated in the consideration of Technique, is generally preferred. The perforations at the bottom of the tube should be perfectly smooth, depressed rather than elevated, and small, to prevent the entrance of the intestinal walls by intra-abdominal pressure, rendering the removal of the tube difficult and painful, and increasing the danger of lighting up inflammation. The objection to the glass tube is that it requires frequent emptying, and even with the most careful practice there is danger of the entrance of pathogenic germs into the peritoneal cavity through it. Another method of drainage is by the gauze drain, which is also described under Technique. Its advantages are that there is no possibility of septic infection of the abdominal cavity. When the drain is removed, which may be at the end of twenty-four to seventy-two hours, it may be replaced by a sterilized rubber tube. The gauze drain is much less likely than the glass one to be followed by a fistulous tract; the tract occupied by it usually heals almost as soon as the remaining portion of the wound.

After the wound is closed, the abdomen should be carefully washed with a 1 : 2000 bichloride-of-mercury solution, and a sponge wet in the solution squeezed over the wound. The wound is then to be dried with a sterilized towel, and protected by pressure made over it while the sides and back are dried, and the patient placed upon a dry sheet or blanket. The dressing may then be applied.

Dressing.—The dressing described in the consideration of Technique may be used, or the following substituted. It is simple in character, consisting of first dusting the wound with iodoform which has been carefully sterilized. This is best done by placing the powder in a test-tube, which is immersed in boiling water for half an hour, and then put in a carefully sterilized box with a perforated lid. The plan of using the iodoform from pill-boxes covered with gauze, which have been standing in the wards of a hospital, is reprehensible, as germs may accumulate in the iodoform and thus be brought in contact with the wound. The iodoform decomposes, neutralizing the ptomaïnes or germ-products, and does not act as a germicide. After dusting the wound it is covered with several pieces of sublimated gauze lightly applied; over this is placed a layer of salicylated cotton, followed by a layer of borated gauze or a sterilized towel, which is held in place by strips of adhesive plaster to which tapes have been attached. These strips are fastened to either side of the abdomen, and not too far back, as in that case the tapes make unpleasant pressure upon the skin, but just so far that their anterior edges will come in close proximity to the dressing. The tapes are tied over the dressing and the whole is held in place by a flannel or crinoline bandage. This dressing is expected to remain for a week or ten days, unless there are indications for its early removal. Where drainage by a glass tube is used a piece of rubber dam about six or eight inches square, having a small opening made in its centre, is stretched over the flange of the tube. The tube is covered with a piece of sterilized gauze or absorbent cotton which has been wrung out of a weak solution of bichloride-of-mercury, and the rubber dam pinned over it, protecting the dressings from being soiled. The gauze drain if used should be surrounded by a good thick layer of dry gauze, which should be changed as frequently as it becomes saturated. The drier the external dressing is kept, the more thoroughly and effectively will it drain.

In ordinary uncomplicated cases the duration of the operation may not be over twenty to thirty minutes. The shorter the time required by the operation consistent with careful attention, the better for the patient.

The method of managing patients after ovariotomy will be found described in the consideration of After-treatment.

ACCIDENTS DURING THE OPERATION.—*Stripping off the Parietal Peritoneum.*—This accident is not likely to occur where care is observed. The operator may overlook the peritoneum, and supposing that it has been opened, push it off from the abdominal walls. More frequently, however, it is likely to be opened without being recognized, and the omentum beneath regarded as the preperitoneal fat. As has already been observed, this may be avoided by noticing that the vessels in the transversalis fascia run transversely, while those in the omentum are vertical. When the omentum is fastened down over the tumor, it is better to find its point of attachment, and tear it up, rather than to open through the omentum itself, on account of the probability of bleeding. The peritoneum may be stripped off during manipulation, as in the introduction of sponges to keep the surfaces dry during the introduction of the sutures. If the opening is small, in introducing a sponge the peritoneum may be pushed in front of it, and a considerable surface be stripped off. Where this has occurred it is better to cut away a portion rather than to risk gangrene.

Rupture of the Cyst.—In delivering the cyst, particularly where the walls are fragile, it may be torn through, permitting the contents to float into the abdominal cavity. This is not an accident of serious importance unless the contents of the cyst are putrid in character, as in suppurating cysts, or, again, in the dermoid varieties, where the oleaginous material is exceedingly difficult to wash out of the cavity. Tearing of the wall of the cyst during its removal necessitates a thorough irrigation of the abdominal cavity to neutralize or remove its contents.

Fatal Hemorrhage.—Fatal hemorrhage during operation was formerly an event of greater frequency than it has been of late. The site of the hemorrhage will have much to do with its character: in large cysts with extensive adhesions we may have hemorrhage taking place from the cyst itself or from vessels that may be torn within its walls, giving rise to a serious condition. In such cases the course of treatment should be to rapidly separate, lift out the cyst, secure its pedicle, and so cut off the supply of blood. In separating adhesions the larger and more vascular should be separated between two ligatures or between a ligature and a pair of hemostats. If the hemorrhage is of a serious character, the assistant may place his hand within the abdomen and compress the abdominal aorta, maintaining the pressure until after the operation is completed. Such a procedure prevents further supply of blood being sent to the tumor, and so arrests the hemorrhage. We may find hemorrhage take place from a very extensive surface, particularly after the removal of malignant disease, or extensive papillary growths behind the uterus, involving its entire posterior surface and the pelvic viscera. In a recent case the diseased tissues were hurriedly removed, and the cavity and bleeding surfaces above were compressed by a number of antiseptic towels packed into the abdominal cavity. This thoroughly controlled the bleeding, but the patient was so enfeebled prior to the operation, and still further exhausted by the bleeding, that she died shortly afterward. Fatal syncope and death may take place in very large tumors from the decreased abdominal pressure. Vessels relieved from pressure become distended by the blood, forming reservoirs, until so much is withdrawn from the circulation that the resulting cerebral anemia is sufficient to cause the death of the patient. In such cases the patient may be said to have bled into her own vessels. Such an occurrence is only likely to take place in very large tumors, and may be obviated by emptying the cyst slowly. When syncope occurs the head should be lowered, the limbs wrapped in warm blankets or bandaged, and an assistant may compress the aorta directly with the hand in the abdominal cavity, while the treatment of the pedicle and the toilet proceeds.

Visceral Injuries.—Injuries to the viscera, particularly the intestines, are likely to occur during complicated operations. It is important before opening the peritoneum to lift it up by forceps, and make a small incision into which the finger can be introduced. The importance of doing this under the eye can be appreciated when we remember that a coil of intestine may be situated between the tumor or cyst and the abdominal parietes, adherent to the latter, when an incision blindly made might result in cutting into or through the intestine. Where adhesions are dense the intestine may be torn into or even across during the progress of the operation. Where such lesions occur the parts should be carefully repaired at once, and measures exercised to prevent soiling of the peritoneal cavity with the contents of the bowel. The intestine should be carefully sutured, and, when torn through to such a degree as to render the vitality of the parts uncertain, its resection and an end-to-end or lateral anastomosis should be practised. Where the operator is provided with rubber rings, as devised by Baldy and Ashton, or bone plates, the lateral anastomosis will be most quickly done. The procedure consists in first closing up the ends of the gut by inverting them, suturing the peritoneal surfaces, and then making an incision near each end upon surfaces which can readily be brought in apposition, fixing these incised surfaces in contact with each other by the rings or plates, which are fastened together generally by four ligatures from each plate. The peritoneal surfaces are then sutured with a row of sutures, preferably of catgut. The end-to-end anastomosis may be done by simple suturing of the surfaces, beginning with sutures between the muscular surfaces, and then a second row around the peritoneum, so that considerable peritoneal surface is opposed. The most difficult cases to suture are those in which the rectum has been torn during the operation. Then, again, portions of the bowel may be so devitalized that they subsequently slough, giving rise to fecal fistula. In tumors situated low down in the pelvis, those that have developed in the broad ligament, and particularly in the papillary forms of ovarian growth, it is quite important to keep in mind the position and relation of the ureter, as this organ may be pulled up or torn off in the enucleation of such masses. It has been referred to in a case which came under the observation of the writer in which the ureter passed directly over the upper surface of a large cyst, and came very near being cut or torn in two during the effort at its enucleation. The bladder may be situated in such a position that it may be injured during the abdominal incision or during the progress of the operation. Thus, where the bladder is drawn up by contact with the cyst and spread out over its anterior surface, it may be overlooked before its true character is suspected. The entire fundus of the bladder has been cut away in the removal of cysts. It has been the misfortune of the operator to open into the bladder before he realized its true character. The peculiar interlaced muscular structure of its wall should cause it to be recognized immediately. Wherever the bladder is opened or injured it should be sutured. In the case in which the entire summit of the bladder was cut away the walls were sutured, opposing a good extent of the outer wall, and the patient recovered. In such injuries it is important also to prevent the bladder becoming unduly distended during the convalescence, especially for the first few days. It should be emptied frequently, in order that the accumulation may not lead to separation of the weak union and consequent leakage of urine.

Incomplete Operations.—We are unable by our most accurate rules of examination always to arrive at a correct and definite diagnosis of either the disease or the structures involved.

An incision of the abdomen may reveal that a tumor is so situated or so extensively adherent to surrounding structures as to render its removal impossible. Incomplete operations were formerly much more frequent than at present. Indeed, there are few cases in which an operation for the removal of a tumor should be discontinued after it has once been begun. In those cases, however, in which an exploratory incision discloses that the disease is malignant, and has already infiltrated tissues which cannot be safely removed, or secondary nodules are found in tissues remote from its origin, the acquisition of such knowledge should be considered a bar to further procedure. If upon opening the abdomen it is found that the entire peritoneal cavity is studded with papillary growths resulting from infection of the peritoneum through the rupture of a papillary cyst, it would be unwise to subject such a patient to the danger incident upon the removal of the original source of the disease.

The cases in which complications too grave to permit of the completion of the operation exist may be subjected to mere closure of the wound where the parts have not been much disturbed; in others it may be necessary to drain: this may be done by a glass tube or preferably by gauze drain, which is efficient and free from the danger of injuring the structures of the pelvis. Where a cyst has been opened, or in any case in which it has been injured, but is found connected with other tissues by firm adhesions to such a degree as to render removal impracticable or unwise, the cyst may be opened, emptied of its contents, brought out and stitched fast to the abdominal wound. The superfluous portion should be cut away. The cavity may be packed with iodoform gauze, which promotes drainage, and by its presence in the sac may lead to an inflammation which will cause its obliteration.

SEQUELÆ.—The subsequent progress of a patient who has been subjected to ovariotomy will depend much upon the manner in which the operation has been conducted. In spite of every precaution that may be taken, there will be some cases of delayed convalescence, due possibly to some latent or pre-existing pathological tendency; but when an operation is carelessly performed and its details are imperfectly carried out, the probability of serious trouble can be appreciated. The operator and his assistants should have so trained themselves that the slightest deviation from a proper course cannot go unnoticed. Of what avail is it to spend much time in securing cleanliness of person, room, and instruments, and then drag the ligature with which the pedicle is to be secured over blankets or dirty tables before its introduction; to dust the wound with iodoform from a box that has been standing open and used in all sorts of cases about a ward; to rub the nose, scratch the head, or touch other non-sterilized objects, and place the hand in the cavity without any precautionary cleansing? Such indiscretions will often explain stitch-abscesses and other septic processes. Pus-collections and cellular inflammations will occur in the pelvis about and posterior to the uterus, due possibly to some infection of serous collections in Douglas's pouch. Elevation of temperature, rapid pulse, and pain continued after the fourth or fifth day should lead to a careful examination for its origin. A mass of exudation in the pelvis should be considered an indication for the administration of salines in free doses until purgation, and the use of rectal and vaginal enemata of hot water at least twice daily. The exudation should be carefully watched, and the appearance of softening, felt either through vagina or rectum, should be considered as requiring prompt evacuation. The latter is accomplished by an opening through the vault of the vagina behind the uterus. The vagina should have been previously carefully disinfected, and the pus-cavity should be irrigated with hydrogen peroxide, followed by sterilized water, and packed with iodoform gauze.

When discussing the details of the operation we endeavored to render prominent the importance of having the nurse acquainted with the number of sponges and catch-forceps in use, and making sure all were removed before the abdomen was closed. That the importance of this precaution has not been exaggerated may be appreciated when we find it recorded that a retained sponge was the cause of death in one of Tait's cases; that Spencer Wells has removed a pair of forceps the following day; that Asdale re-operated a year later to remove forceps, and was obliged to resect the intestines; and many other such cases have been recorded. But recently a patient came under observation in whom a skillful operation was rendered less beneficial by the presence of a gauze pad which was removed some months later.

Intestinal Complications.—After operations for inflammatory troubles intestinal complications are not infrequent. It is difficult to make sure the intestines are free from twists when replaced, but danger is aggravated when we have bands of inflammatory adhesions, or openings in the omentum or mesentery, beneath or through which a knuckle of intestine may slip and become strangulated. Laceration of the coats of the intestine will affect its peristaltic action, and may lead to paralysis of a section, with ensuing symptoms of obstruction. A twist or volvulus may become fixed so that nothing can pass through it. If the walls are already weakened, a fecal fistula may ensue, as has occurred in our experience during the past year. A woman, much prostrated by puerperal sepsis, was subjected to abdominal section, the pus evacuated, forming as it did reservoirs in front and behind the uterus, and the abdomen irrigated and drained. She did well for a few days, when a discharge of feces occurred, and upon her death some weeks later a volvulus was found. In a case operated upon at the Philadelphia Hospital by a colleague obstruction occurred five weeks after operation. The patient was seized with stercoraceous vomiting. A resection was performed and five feet of intestine torn up, finding at its base a distinct volvulus, which was untwisted. The patient recovered after a prolonged convalescence. The importance of early re-opening the abdomen in such cases cannot be over-estimated, as the obstruction may be due to strangulation of a knuckle of intestine beneath inflammatory bands or to its enclosure between the sutures in the wound.

Fecal Fistulæ.—The proper method of treatment of fecal fistulæ is still a debatable question. If the opening is small, it may be left to Nature with the assurance that with cleanliness it will close. Should it be large and all the feces pass through it, and particularly if it be situated high up, the better plan would be to reopen the abdomen and seek for the opening in the bowel, and close it or resect a portion of the intestine as may seem best.

Adhesions.—It is quite probable that no case subjected to operation is subsequently free from adhesions, though their frequency and extent will depend somewhat upon the presence of sepsis. The more aseptic the operation and the less the peritoneum is injured, the slighter and more fragile will be the adhesions.

They are more likely to take place between the abdominal incision and the underlying viscera, and between the stump of the pedicle and adjoining coils of intestines. The former may be rendered less annoying by drawing down the omentum to protect the wound, and the stumps may be turned forward and stitched to the anterior fold of the broad ligament. Dusting a film of aristol over the intestines to prevent adhesions has been recommended, but the procedure is of little practical use. Where adhesions have formed pain may be caused by traction upon them during the peristaltic action of the intestines. Pain thus caused has been so great that patients have submitted themselves to subsequent operation for relief. It is questionable how much is gained by such attempts, as whenever adhesions are broken up new injuries are produced, which increase the danger of inflammation and additional adhesions.

In all secondary operations the possibility of adhesion to the cicatrix should be kept in mind, and the incision should be prolonged upward to obviate the danger of injuring the intestine.

Ventral Hernia.—A weakened ventrum is not an infrequent result of abdominal incision, and is probably its most frequent sequel. If neglected, a large portion of the intestine may project, covered only by skin and integument. It is caused by defective union of the opposed surfaces and by the patient leaving the bed too early. Where a single row of sutures are used great care should be exercised to bring within the loop of the suture the entire thickness of the wall, especially the aponeurosis, and the patient should remain in bed seventeen or eighteen days.

Probably the preferable plan of closing is to introduce a double row of sutures of catgut or silkworm-gut. The first row may include the peritoneum, muscle, and aponeurosis; the second is through the skin, and drawn tight enough to oppose its cut edges.

When hernia occurs the methods of overcoming its discomfort and progressive development are either mechanical or surgical. A number of pads and bandages have been used. The Marvin abdominal supporter has in our experience proved most serviceable. The surgical measures consist in cutting down and laying bare the aponeurosis of the muscle, which is then united.

DISEASES OF THE URETHRA, BLADDER, AND URETERS.

DISEASES OF THE URETHRA.

ATRESIA.—Atresia of the female urethra occurs as a congenital condition. It may affect the whole length of the urethra or only a short portion. Frequently in these cases there exists an opening at the umbilicus through which the fetus in intra-uterine life discharged its urine. This persists through extra-uterine life as well, unless an opening into the bladder below is substituted by operation.

If the urethra is separated from the bladder by a septum, the condition is best relieved after carefully establishing the position of the septum with the sound, by perforating it with a small trocar and canula, thus establishing the communication, the caliber of which may subsequently be enlarged. This operation can be more satisfactorily performed, and with less danger, in adult life.

Frequently in a fetus having such a defect, and no avenue for fistulous discharge *per umbilicum*, the abdomen becomes distended to such a degree as to require puncture or the bladder may rupture spontaneously during birth.

In hypospadias the urethral orifice lies at some point within the vagina: slight degrees of hypospadias often pass unnoticed. Where the opening is higher up, the urethral orifice is not evident on inspecting the external genitalia, and the urine appears to be discharged from the vagina.

TREATMENT.—Where the upper part of the urethra is perfect, flaps may be loosened at the sides and brought down to be approximated in the median line. The approximation of these united flaps to the urethra may either be made at once or subsequently, after the satisfactory formation of the anterior part of the canal is assured. A fine needle armed with fine silk should be used. The canal formed should always be a little larger than it is desired the future canal should remain, slight contraction being allowed for.

DILATATION.—This condition often follows unwise attempts to explore the bladder by rapid dilatation and the introduction of the index finger. Permanent incontinence of urine, beyond repair, has repeatedly been the consequence of such injudicious treatment for a dysuria or has followed efforts to explore the bladder. Dilatation has also often been occasioned by dragging a large stone out of the bladder through the urethra.

The incontinence which follows dilatation is one of the most distressing, and at the same time most difficult, of all gynecological complaints to remedy.

The serious injury seems to be at the internal urethral orifice. Attempts to cure it by a resection of this part of the urethra do not succeed in restoring continence of urine.

Some successful efforts have been made to relieve these sufferers by denuding an area on each side of the external urethral orifice, and then passing sutures in such a way as to produce tension, lifting the posterior wall of the urethra firmly up against the anterior. In this way the urine is held back until the obstruction is overcome by a voluntary pressure from above.

GONORRHEAL INFECTION OF THE URETHRA.—This condition is more frequent than the few recorded observations would lead one to suppose. The gonococcus enters the bladder by this avenue, and urethritis is, therefore, one of its initial stages.

The injected red urethral orifice is much enlarged by the pouting mucous membrane, whose appearance but indicates the condition of the remainder of the canal. A little pus may appear constantly in the folds of the mucous membrane, or be brought into view by stroking the urethra on the vaginal surface from the neck of the bladder down. Just within the orifice, or in some cases everted so as to be conspicuous externally, are two little orifices, one on either side and posteriorly, leading to Skene's glands, which run up parallel to the urethra for from a half to three-quarters of an inch. The gonococci are peculiarly prone to linger in these openings, and often, long after all trace of the disease is supposed to have disappeared, one or more drops of thick yellow pus can be squeezed out of them.

The endoscope, which is easily used in the female urethra, shows that the whole canal is inflamed, and in some instances discloses the presence of small ulcers.

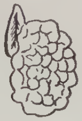
The TREATMENT is rarely limited to the urethra alone, but includes the eradication of a more or less extensive gonorrheal infection, including that of the bladder. Appropriate general treatment, copaiba, etc., should be administered. Local applications may be made of nitrate of silver, 5–10 per cent., or of ichthyol. It may be necessary to lay Skene's glands open in some old persistent cases.

ABSCESS.—This is a peculiar and a rare disease of uncertain cause. It has been attributed to distension and ulceration of glands in the floor of the urethra, and to the rupture of fibres of the urethra with a sagging at this point, in which the urine accumulates and decomposes, occasioning inflammatory changes terminating in abscess. The condition is recognized by a fluctuant ovoid mass projecting into the vagina from the anterior wall. Upon pressure, pus or urine mixed with pus is forced out of the urethra, and the sac being emptied remains flaccid for a time.

The TREATMENT is simple: the sac is exposed by retracting the posterior vaginal wall with a Sims speculum, and after being caught with a double tenaculum is incised for its whole length; enough is then excised that the urethral canal will be left its normal size when the remaining flaps are brought together.

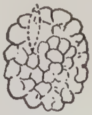
CARUNCLE.—This is not a common disease. True caruncle is a fleshy deep-red protuberance from some portion of the urethral orifice, having the appearance of a raspberry or a diminutive cock's comb. Its chief clinical peculiarity is its exquisite sensitiveness, the cause of which has never been adequately explained, but has been naturally supposed to be an unusually abundant superficial nerve-supply, or a denudation of the surface epithelium laying bare nerve-papillæ. Every touch or movement causes great pain, which becomes agonizing in the act of micturition. In spite of this great suffering, often reducing the patient extremely, she will sometimes allow years to pass before seeking relief.

FIG. 351.



Caruncle attached to the Posterior Lip of the Urethral Orifice.

FIG. 352.



Caruncle occluding the Urethral Orifice.

TREATMENT.—The only proper plan is to eradicate the growth—if small, by the actual cautery, which may be directly applied so as to destroy it, when it may later be allowed to slough off. Larger growths are best treated by excision, taking good care to include some of the tissue below the base, as after an imperfect removal there is usually a recurrence. The bleeding can readily be checked by uniting the excised area with delicate silk sutures. Care must be exercised not to include enough of the urethral orifice to narrow it considerably by the excision, thus producing a stricture.

Malignant Neoplasms.—The urethra is in rare cases liable to invasion by malignant diseases, sarcoma and carcinoma. Sarcoma occurs more frequently in small children, and carcinoma in advanced life. Sarcomata present a livid bluish-red appearance, with a more or less smooth, glistening surface, projecting from the urethral orifice.

The symptoms occasioned are due to the mechanical obstruction of the urethra, rendering the voidance of urine more or less difficult.

The proper treatment is immediate extirpation with the knife of such part of the urethra as is involved in the disease. The procedure may prove a bloody one, but the vessels are all exposed to view, and can be controlled by passing ligatures around them with a curved needle. The more difficult cases will be those in which the extent of the disease is not apparent at the beginning, and in which the greater part of the urethra is involved. The ultimate result of the operation will prove futile unless the extirpation is carried far beyond the apparent limits of the disease.

Carcinoma affects the urethral orifice; it then presents a ragged, hard, easily-bleeding, prominent surface. The disease may be extirpated in its earlier stages in the same manner as sarcoma, by removing the affected end of the urethra and uniting the mucous membrane of the canal to the vagina, establishing an urethral orifice higher up.

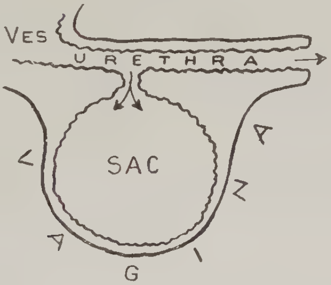
Urethral Polyp.—This form of tumor rarely occurs in the urethra. It is composed of a delicately fibrillated soft, fibrous tissue, is usually reddish in color, having over its surface a network of bright-red vessels. It is usually attached by a delicate pedicle, and frequently hangs pendulous from the external urethral orifice. It is painless, and occasions at times only slight discomfort by partially occluding the urethra and thus rendering micturition difficult.

The diagnosis is usually easy, the only conditions for which it may be mistaken being caruncle and prolapse of the urethral mucous membrane. As a caruncle is attached to the margins of the urethra, usually the lower, is sessile and exceedingly painful, there is little chance of error in this direction, while the rosette appearance of prolapsus with the ureteral orifice in the centre serves to differentiate it.

Treatment.—The treatment consists in excision by means of the écraseur or removal by strangulation with a fine silk ligature. It has no tendency to return after removal.

Urethrocele.—Localized dilatation of the urethra in its middle third, forming a sac with a more or less constricted mouth, constitutes urethrocele. The upper wall of the urethra, as a rule, maintains its normal position, but it may sag slightly or become tortuous as the diverticulum enlarges.

Fig. 353.



Urethral Diverticulum, containing pus and residual urine.

Etiology.—Numerous causes are assigned for this condition, the most plausible being that of traumatism from labor or accident. Stricture is also said to be a cause, but as it so rarely accompanies urethrocele, doubt is thrown upon this statement. Englisch believes that it is due to the breaking of a congenital cyst of the urethral wall into the urethra. As this diverticulum is most frequently found in women who have borne children, the traumatism of labor must be accepted as the predominating cause in the production of urethrocele.

Symptoms.—The collection and stagnation of urine in the diverticulum gives rise to great discomfort. The patient usually complains of a constant desire to urinate, which act is accompanied by sharp cutting pains. If the urethrocele is of much size, the urine which collects there is expelled when the patient coughs, laughs, or sneezes, or when she walks. This causes excoriation of the surrounding parts, and is productive of much mental suffering. The residual urine becomes ammoniacal, and occasions an urethritis which may extend up into the bladder and produce an obstinate cystitis.

DIAGNOSIS.—If the dilatation is marked, it may be discovered by digital examination through the anterior vaginal wall. The extent and location of the dilatation are best determined by means of the sound. By curving the sound and passing it, with the point upward, against the roof of the urethra, it glides without difficulty into the bladder; but if the point be turned downward, it is at once arrested in the sac. Also by passing a catheter a small quantity of urine is obtained, first from the urethrocele, and then, when the instrument is introduced further and enters the bladder, there is a second flow of urine.

TREATMENT.—The best plan of treatment is that of Bozeman, who makes an opening in the anterior vaginal wall in the most dependent part of the sac. By this means free drainage is secured, and the inflamed tissue is permitted to resume its normal condition, when a plastic operation can be performed for the restoration of the urethra to its normal caliber.

STRICTURE.—Organic stricture of the urethra is of rare occurrence, as the normal caliber of this canal is such that even if there be a slight narrowing in its course, the symptoms are so insignificant as to give rise to no discomfort. It is only in those cases where there is marked cicatricial contraction that this condition calls for treatment. Strictures of large caliber, as described by Skene, have a problematic existence.

Traumatism, especially from labor, gonorrheal urethritis, syphilis, and very rarely tuberculosis, may cause stricture. The applications of nitric acid, corrosive sublimate, and other caustics are also reported as causal agents.

In vesico-vaginal fistula of long standing there is often functional atrophy of the muscular coats of the urethra from disuse, resulting in a general narrowing of its caliber.

SYMPTOMS.—Frequent and difficult micturition, gradually increasing, is the chief symptom of stricture. In rare cases there is incontinence, while in others there may be infrequent micturition, at times approaching retention. In cases of long standing dilatation of the bladder or cystitis may result. According to Skene, the symptoms of stricture at the vesical end of the urethra are out of all proportion to the lesion.

Diagnosis.—As the symptoms are not sufficiently suggestive, the urethra should always be examined. A vaginal examination usually shows thickening at some part on the anterior wall corresponding to the course of the urethra. If a sound be introduced, it will meet with resistance at this point, and it may not be possible to pass it farther. The diagnosis is not difficult, and is made by means of the sound and by vaginal examination.

Prognosis.—In all cases of short duration the prognosis is favorable. Only where cystitis or dilatation of the bladder coexists should the prognosis be guarded.

Treatment.—Gradual dilatation should be practised by means of Hegar's dilators, starting with one of the small sizes and gradually leading up to a No. 15. Care should be used not to rupture the urethra by too rapid dilatations, as incontinence may result from such an accident. Very rarely when the cicatricial tissue is dense and unyielding, division of the stricture according to Ottis's method in stricture in the male may be required.

Prolapse.—Prolapse or ectropion of the urethral mucous membrane is not infrequently found in female children, but is of rare occurrence in women. Vesical calculus, urethritis, rectal irritation as from fissure, hemorrhoids, or prolapsus, and in children irritation from intestinal parasites, especially ascarides, are frequently associated with, and usually responsible for, prolapse of the urethra.

Symptoms.—Frequent and painful micturition and tenderness about the urethral triangle are the chief symptoms. It is also frequently attended with painful coitus, and may interfere with walking.

Diagnosis.—As the symptoms are not diagnostic, a visual examination is necessary. The prolapsed portion of the urethral mucous membrane encircles the mouth of the urethra, and may present the appearance of a rosette. The urethral opening in the centre is characteristic, and differentiates this condition from caruncle or other tumors. The urethral fold, if œdematous or swollen, may not be replaced, but, as a rule, when the patient is placed in the lithotomy position and slight manipulation is made, the mucous membrane at once disappears within the urethra. If the prolapsus is of long standing, the mucous membrane may present a glazed, dry, or excoriated surface.

TREATMENT.—In recent cases, especially in children, after the prolapsed membrane is replaced the patient should remain in bed in the recumbent position for a few days. In the mean time astringent urethral suppositories composed of tannin, or topical applications of dilute carbolic acid or iodine, may assist in retaining the mucous membrane *in situ* by taking up the lax tissue.

The bladder should be carefully explored for stone, tumors, or polyps. The bowels should be kept loose, as straining at stool always increases the prolapsus. If the condition is persistent and does not yield to local treatment, the redundant mucous membrane should be excised, and the external or vaginal and the urethral mucous membrane brought together by radiating sutures of fine silk. The galvano- or Paquelin's cautery may be used for the same purpose.

If there is great redundancy of the mucous membrane, Emmet's buttonhole operation may be resorted to. By this method a hole is made in the urethro-vaginal septum, and the urethral mucous membrane is drawn through until the prolapsed portion is returned into the urethra, when it is stitched in the angles of the wound and snipped off. The fistula may be closed at the same sitting, or later if drainage is desirable.

DISEASES OF THE BLADDER.

CONGENITAL MALFORMATIONS OF THE BLADDER.—The bladder is subject to a great number of deformities due to embryological deviations, but, fortunately, they are of rare occurrence.

In some cases the bladder is bipartite, with two cavities partially or completely separated by a septum. These cavities may lie side by side or one above the other, the ureters opening into one or both. Blasius has reported a case in which the bladder was divided into five compartments.

Two or more bladders are said to coexist in some instances, but in the larger number of reported cases the condition is probably due to extreme sacculation as the result of disease or from displacement caused by the pressure of neighboring organs. Thus in prolapsus uteri a diverticulum may be found in the bladder which on superficial examination might suggest two bladders. Demandie suggests that the so-called supernumerary bladder may be the pouch of a dilated urachus, and reports a case in support of this statement. It is possible for a congenital cyst in close proximity to the bladder to simulate a supernumerary bladder. Cases are reported in which the bladder was absent and the ureter emptied into the rectum, vagina, or urethra. Merckel, Fleury, Oliver, and Blasius each have reported cases in which the ureters emptied into the urethra.

A patulous urachus may exist as a canal of small caliber leading from the bladder to the umbilicus, or it may be distended in one or more places as a cyst. Urine may be discharged from the umbilicus through the urachus. In one case which has been recorded the umbilicus communicated with the bladder. An arrest in development may leave the bladder as a small pear-shaped organ, or there may be a congenital dilatation either uniform or localized.

Thus it will be seen from these few cases that the bladder is subject to various anomalies. The complicated embryological development of the genito-urinary organs renders them liable to many deformities.

By far the most frequent of the congenital defects of this viscus is

Extroversion or Extrophy of the Bladder.

This anomaly is far more frequent in the male than in the female sex. It consists in the absence of the anterior walls of the bladder, of the corresponding part of the anterior abdominal wall, and often of the symphysis pubis. The clitoris is slit into two portions, the anterior commissure of the vulva is absent, and the bladder opens directly into the vagina. The vagina may be normal or appear as an elongated transverse fissure. As the uterus and its appendages are usually normal, extrophy of the bladder is not incompatible with childbearing. The vaginal orifice may even be occluded with a hymen. This deformity is not detrimental to long life. The deficiency in the abdominal parietes may be slight or extensive, depending upon the distance above the symphysis at which the diastasis occurs, and also upon the degree of separation between the pubic bones. The separation in the abdominal muscles may occur above the usual site of the umbilicus, which is absent in such cases, or it may take place lower down, the fibres of these muscles running out to their point of insertion, leaving a triangular opening in the abdominal wall. The space between the pubic bones may be slight or extensive, and is either filled in with fibrous tissue or exists as an unobstructed opening. The bladder is pushed forward by the viscera crowding down upon its posterior wall, and pouts out as a spongy, red-looking surface. The continual irritation of the clothing and exposure to the air, causing a deposit of urinary salts, keep the mucous membrane constantly inflamed. The slightest traumatism causes bleeding. The orifices of the ureter can usually be seen, and are often dilated. The urine is always escaping, and if great cleanliness is not observed the surrounding parts become inflamed and excoriated. Even with the greatest care such a condition may arise.

TREATMENT.—The treatment of this anomaly is a subject of no little importance, from the great distress occasioned by the constant dribbling of the urine and the excoriation of the parts. In all cases the treatment, whether operative or mechanical, is only palliative, as the function of the bladder cannot be completely restored. Various mechanical devices have been employed for conducting the urine away from the bladder, but they are usually unsatisfactory. The repair of the defect by a plastic operation should always be attempted. On account of the impossibility of keeping the field aseptic failure is frequent, and many operations may be required to accomplish the result desired.

A number of ingenious operations have been devised for extrophy of the bladder, but those employing a central flap made from above with lateral flaps appear to us to be the most advisable. Thiersch's operation embraces these principles, and is frequently successful. The deformity in the urethra should be first corrected before the vesical defect is repaired.

The method as devised by Thiersch consists, first, in the lifting up of a flap from the centre of the abdomen above the opening. This flap should be of sufficient size to close in the bladder, and must have a pedicle. The edges of the abdominal opening are freshened, and the flap is brought down in such a way as to throw the skin-surface against the mucous membrane of the bladder. The margins of the flap are thus stitched to the denuded edges of the abdominal opening. Bridge-like flaps are dissected up from the inguinal regions on either side of the opening, leaving both ends attached. Iodoform gauze is packed beneath these flaps until granulations spring up and the nutrition of the parts is well established, when the upper ends may be cut and the flaps pushed over upon the granulating surface of the central flap and secured in place by suture. In this way the first flap is reinforced and the lateral edges of the denuded opening are protected. In all cases there will be incontinence of urine, as the sphincter muscles are absent, and so far no method of treatment has been advanced to replace their function. For this reason some form of ambulatory urinal is required. The great advantage of this operation is that the constant dribbling of urine over the thighs, genitals, and buttocks is obviated. Thiersch, in order to do away with the necessity of using a urinal in women, has established an artificial channel from the bladder to the rectum. This, however, is not advisable, as the rectum is not tolerant to urine, and if it lose its function the condition of the patient is more deplorable than in the beginning. Billroth advises making a small fistula through the central flap, as the recti muscles often close the opening sufficiently to retain urine.

If the skin extends slowly toward the centre of the flaps, transplantation should be employed to hasten this process. Trendelenberg divides the symphysis pubis, if united, and causes the ends to overlap by means of a plaster cast. In this way the separated parietes are brought into apposition by causing a contracted pelvis. He then freshens the edges and brings them together with strong sutures. Czerny closes the opening by detaching the vesical mucous membrane, leaving a small area as an avenue for nutrition, and unites the edges in the central line, thus restoring the mucous lining of the bladder; he then reinforces this mucous layer by means of lateral bridge-flaps.

Preceding operations for the restoration of extroversion of the bladder, the surrounding parts must be restored to a healthy condition by the liberal use of zinc-oxide ointment. The urine should be kept bland by the use of proper drugs if the alkalinity is so marked as to produce irritation. The general nutrition of the patient should be carefully looked into and no operative measure instituted before she is in good health. If the operation be successful, some form of ambulatory urinal may be prescribed, and the patient is able to live much more comfortably, as the excoriation and inflammation of surrounding parts, the disgusting odor, and constant dribbling of urine, are obviated.

Irritable Bladder.—Under this heading are grouped those etiological factors, either intrinsic or extrinsic to the bladder, which are not sufficient to induce organic disease of this organ, but which keep it in a constant state of irritability.

The symptoms at times are such as to lead to a diagnosis of cystitis. A careful examination, however, shows the bladder to be apparently normal, and we are forced to ascribe the symptoms to simple irritation of the peripheral nerves, either from direct or reflex causes.

Probably the most painful form of irritable bladder is that following plastic or abdominal operations, especially the latter. In many abdominal-section cases the symptoms of irritation so closely simulate those of cystitis as to lead to the latter diagnosis.

In all gynecological cases a careful chemical and microscopical examination of the urine should be made before operation, as we then have a control test by which future examinations may be compared. Following cœliotomy, the urine is generally of high specific gravity, has a heavy sediment, consisting usually of amorphous urates and phosphatic crystals, and is capable of producing great vesical irritability, if not a light grade of cystitis.

Patients frequently complain of vesical disorders, especially painful micturition, for two to five days following operation, and it will be noted that as the urine decreases in specific gravity, and as the heavy sediment disappears, the symptoms of irritation have also gradually decreased, and by the time the urine has reached the normal these have entirely disappeared. Under these circumstances the term "irritable bladder" is the most expressive, as the symptoms of cystitis are not so fleeting in character. In these cases the frequent and painful micturition must be ascribed to direct chemical irritation from the heavily-charged urine.

The quantity of urine is frequently so much decreased following operations as to suggest suppression from nephritis or obstruction of one or both ureters; but it will be found, if the urine be measured from day to day, that the quantity increases in an ascending ratio until about the tenth day, when it again reaches the normal. It will thus be seen that for at least five days there is ample cause for irritability of the bladder from the concentrated urine.

Again, the highly alkaline urine of pyonephrosis and other kidney affections, along with acrid pus, which is often found in these cases, may cause great irritation, which soon runs into cystitis if the cause is not removed.

Another factor in the production of this condition in a certain number of operation cases is probably that of reflex sympathetic irritation. In pelvic inflammatory disease in which the uterine appendages are densely adherent, and require considerable force to enucleate them, or where a tumor is extensively adherent, there must be more or less irritability of the bladder from mere contiguity.

During pregnancy there is frequently a functional irritability, especially in hyperesthetic individuals, from pressure of the gravid womb. This may occur in any month of pregnancy, and is frequently very annoying. The same condition may arise during the growth of a myoma or other large tumor.

Dislocations of the bladder give rise to irritability, as, for instance, in cystocele accompanying prolapsus uteri; here it is due frequently to the deposition of urinary salts in the diverticulum, and often runs into chronic cystitis.

It is not uncommon for the bladder to be adherent to pelvic tumors, which, as they increase in size, drag the organ upward and increase the tension on the vesical neck, thus causing frequent and painful micturition.

Hysteria also has as one of its innumerable symptoms irritability of the bladder, which may be so marked as to lead to urinary incontinence or spasmodic retention.

Urethral caruncle, carcinoma of adjacent organs, prolapsus of the rectum, fissure in ano, rectal ulcer, and hemorrhoids may give rise reflexly to irritability of the bladder. Excessive venery is also said to be a cause. Various emotional disturbances, such as grief, joy, and pain, may also act as etiological factors in this condition.

Frequently in disease of the ureters the symptoms of irritable bladder are so marked as to mask the true condition.

Of all inflammatory diseases of the uterus and its appendages one of the most annoying symptoms is painful micturition. In these cases during life the cystoscope reveals no change in the vesical mucous membrane, and if such a case comes to autopsy a careful pathological examination shows the vesical mucous membrane to be normal. The most rational explanation of these phenomena in such cases is that of reflex irritability from contiguity of the organs.

Symptoms.—The symptoms frequently so closely simulate those of cystitis as to lead to that diagnosis if a urinary examination is not made. There may be frequent and painful micturition, at times even strangury; dull, heavy pains over the pubes, radiating upward into the loins and downward into the thighs and external genitalia. In other cases there may be a spasmodic condition of the sphincter vesicæ, causing complete retention. Incontinence may be present in some cases. In post-operative irritability of the bladder the urine is very characteristic. In irritability due to pregnancy, pressure from tumors, reflex causes, etc. the urine is very different from the above.

Diagnosis.—Upon the urinary examination depends the diagnosis. In simple irritability following operation the specific gravity of the urine is rarely less than 1020, and may be as high as 1040; the acidity is usually marked; the color is high, and on standing the urine deposits a heavy reddish or reddish-yellow sediment, which usually disappears on boiling. The chemical examination shows no albumen or at most only a slight trace. The microscopic examination reveals a field heavily laden with amorphous urates or phosphatic crystals.

Upon the absence of pus and bladder epithelium depends the diagnosis of irritability. In the clear limpid urine of low specific gravity the microscopic examination is usually negative.

In the early stage of cystitis, when there is only congestion of the mucous membrane, before the leucocytes have wandered from the vessels, no pus will be observed on microscopic examination, and at this stage a differential diagnosis between irritability and inflammation of the bladder is not possible. For this reason when there are symptoms of irritability the urine should be examined at least every twenty-four hours until pus is found or excluded.

Treatment.—As the treatment must be largely directed toward the cause, each case will be a law unto itself, and may require special treatment.

In operative cases, if the symptoms are severe, the bladder should be frequently catheterized to prevent the accumulation of heavily-charged urine. In exceptional cases irrigation may be resorted to especially if there is fear of cystitis. As soon as the patient recovers from the nausea following the anesthesia a mild diuretic, such as liquor potassii citratis or spt. ætheris nitrosi, may be administered. The following combination of these drugs is often of service:

℞. Spt. æther. nitrosi, f℥j;
Liq. potas. citratis, q. s. f℥iv.—M.
Sig. Dessertspoonful every four hours.

This increases the urinary excretion and renders the urine more bland.

When the gravid uterus is responsible for the irritability, little can be done unless this organ is in malposition, when it can be replaced.

In hysterical irritability there is frequently retention of urine instead of too frequent micturition. In these cases all measures should be resorted to before that of catheterization, as the so-called "catheter habit" may be easily established in neurotic women.

When the irritability is due to reflex causes, no treatment is of value except that directed toward the removal of the cause; thus in urethral caruncle, fissure in ano, etc. treatment directed to the vesical symptoms would be valueless.

In nervous women the bromide salts may be given in small doses, and often act well in allaying the irritability. When there is exposure of the vesical sphincter, accompanied with great pain and retention, it may be necessary to resort to opiates or chloral. A rectal enema of starch-water with ten drops of the tincture of opium often gives immediate relief. In some cases rectal injections of hot water serve as well in overcoming this spasmodic condition. Hot applications over the vesical area often are of value. Belladonna suppositories are also recommended, and seem to do good in those cases of irritability due to reflex causes. Diluent fluids and pure water should be liberally injected.

CYSTITIS.—Inflammation of the bladder occurs either as an acute or a chronic process.

ETIOLOGY.—The most frequent cause of cystitis is the introduction of septic matter into the bladder by means of catheters, bougies, or other instruments. The gonococcus may also be the infecting agent, gaining access through the urethra from the inflamed vagina.

From motives of delicacy women often fail to empty the bladder when travelling or in public places, and as a result a severe cystitis is induced by over-distension. Other frequent causes of inflammation of the bladder are pathological changes in the urine from fermentation or excessive excretion of urinary salts. Skene believes that no abnormality of the urine will excite acute inflammation in the healthy bladder, but believes that a previously diseased mucous membrane must exist before abnormal urine can give rise to cystitis.

A number of other writers, however, hold that decomposing urine is of itself sufficient to excite the inflammatory process. Traumatism from labor or other sources, as kicks or blows, may induce a violent cystitis, especially if the bladder be distended with urine.

In labor, during the passage of the child's head, the urethra may be bruised against the symphysis pubis, and later the mucous membrane swells, occluding the urethral canal, and thus causes retention of urine. In such cases the bladder may be greatly distended, but the constant dribbling of urine causes the nurse or doctor to regard it as only a temporary incontinence, and as a result a severe cystitis arises before the cause is discovered. Foreign bodies, tumors, and calculi are all provocative of cystitis.

Inflammation of the bladder is also occasionally the result of a direct extension from some neighboring organs, as in salpingitis, vaginitis, pelvic abscess, carcinoma of the vagina, uterus, or rectum, pyonephrosis, ureteritis, peritonitis, etc.

Chemical irritation from the ingestion or local application of cantharides or turpentine or the use of ethereal oils is also a rare cause of this disease. Injections of strong solutions of silver nitrate and other drugs may cause a severe inflammation.

PATHOLOGY.—In the early stage of an acute cystitis the mucous membrane is red and congested, but is otherwise normal; later the changes are marked, the walls of the bladder becoming thickened and the mucous surface covered with pus, fibrin, and exfoliated epithelium. Small bleeding areas where the epithelium has become detached are often seen.

In the chronic process the pathological changes are still more extensive. The muscular and fibrous coats are greatly hypertrophied, and the actual cavity of the bladder is much decreased by the thickening and contraction of its walls. The rugæ stand out as prominent ridges and may assume a polypoid form.

Hemorrhage occurs into the mucous membrane, and appears as dark ecchymotic patches, which later change to slate-color as the extravasated blood is absorbed, leaving only the coloring matter in the tissues as a more or less permanent stain. As a rule, when the cystitis arises as a result of over-distension the bladder-walls will be thin and parchment-like. In these cases the diphtheritic or croupous type of inflammation is most likely to occur. The entire mucous membrane is extensively involved, and is covered with a layer of fibrinous material or false membrane, which may be thrown off as a complete cast of the interior of the bladder.

In the more severe cases of diphtheritic cystitis this membrane is composed not only of necrotic mucous membrane, but also at times the muscular coat is included. It has been stated that portions of the peritoneal covering of the bladder have been included in these casts. Where there is such extensive inflammation of the bladder the surrounding organs are more or less involved through extension by continuity, and are closely adherent to one another.

In some cases the diphtheritic process becomes localized, and deep erosions or ragged ulcers result. These ulcerated areas may only involve the mucous coat, or may extend deeper and attack the muscular coat, and in rare instances perforate the bladder-wall.

The urine is usually intensely alkaline and heavily laden with mucus and with urinary salts, especially the phosphatic. These salts are often deposited as fine incrustations on the ulcerated areas.

When voided the urine may be of a reddish or brownish or milky color, and if allowed to stand for a few hours in a conical glass, a thick yellowish or reddish sediment settles to the bottom, while the top is clear, or if bacteria be present it will usually be very turbid. On examining such a specimen microscopically there will be found a large number of leucocytes or red corpuscles, pavement epithelium, isolated or in clumps, and often large numbers of crystals of triple phosphates. If the urine has undergone fermentation either within or outside the bladder, myriads of an actively motile bacterium will be seen.

The worst forms of diphtheritic cystitis may merge into gangrene and the whole bladder be involved in a putrid sloughing mass. Rokitansky has described a peculiar ulcer of the bladder which he thinks is analogous to the round ulcer of the stomach.

As a result of the hypertrophic thickening of the bladder-walls the vesical orifices of the urethra may be partially occluded, and dilatation of the ureters, pyonephrosis, or hydronephrosis may occur.

Symptoms.—In no condition is the pain more agonizing than in an acute or ulcerative cystitis. The pain is usually most severe above and behind the pubes, radiating into the groin and down the thighs. If able to be about, the patient walks very slowly and the body is slightly inclined forward; if in bed, the legs are usually flexed upon the abdomen, as the slightest jar or tension on the abdominal muscle increases the pain. The desire to void the urine is constant, and the act is attended with sharp lancinating pains at the base of the bladder, which decrease after the urine is voided. A few drops of blood may be ejected with the urine. There is usually constant dull pain over the pubes, which increases as the bladder is distended with urine.

Pressure over the pubes causes great pain, and at times the tenderness in the region is so marked that even the weight of the bed-clothing cannot be borne. Following urination there is usually a sensation as though a few drops of urine yet remained, which gives rise to constant bearing-down pains for hours after. These pains may be so urgent as to cause the patient to remain for hours on the chamber, and may cause her to scream out with agony. There is often dull pain in the perineum, and occasionally a patient describes peculiar sensations about the umbilicus.

Increased frequency of micturition is an invariable symptom in cystitis, in acute cases the desire being constant; in milder cases less frequent, but always urgent.

Hematuria is frequent in the early stage of the inflammation, and at times there may be little else than pure blood voided. As the process becomes older the blood in the urine diminishes, and may entirely disappear. The appearance of the urine, which has been described above, is also characteristic. If micro-organisms have gained access to the bladder, fermentation of the urine results, and the odor of the recently-voided specimen is excessively ammoniacal and fetid. In acute or ulcerative cystitis defecation may be painful and menstruation is often deranged. In acute cases the attack is ushered in by a rigor, followed by a slight increase in temperature and sharp pain in the region of the bladder. If of the milder type of cystitis, a few days suffice to free the patient from all discomfort.

In the more severe septic or diphtheritic cases the symptoms from the onset indicate a very grave condition. The temperature ranges between 101° and 103° F.; the rigors are severe and occur at intervals for days; the tongue becomes dry, glazed, and coated, and may be fissured; there are headache and vomiting, and occasionally delirium. Micturition is difficult and excessively painful, and may be impossible on account of the occlusion of the ureteral orifice with false membrane. If the bladder is catheterized, only a small amount of urine can be drawn without cleansing the catheter of shreds of membrane.

The bladder may become greatly distended on account of retention. The urine has an excessively fetid odor and is of a brownish or reddish color. Large pieces of membrane, and at times a complete cast of the interior of the bladder, may be expelled through the urethra.

The patient sinks into a typhoid state; the pulse becomes rapid, running, and feeble; the temperature gradually rises during the day, reaching its highest point in the evening; there may be carphologia and subsultus, and she finally goes into profound collapse and dies.

As the kidneys are often much hindered in their action because of the vesical disorder, there may be total suppression of urine, followed by uremia, from which she dies.

DIAGNOSIS.—The dull heavy pain over the pubes, the sharp lancinating pain during micturition, the frequent desire to void the urine, are all subjective symptoms strongly indicative of cystitis.

In the irritable bladder due to inflammation of neighboring organs or to a uterus in malposition, the symptoms may closely resemble those of cystitis, but in such cases an examination of the urine will at once exclude cystitis, as in irritable bladder from reflex or other causes the urine is most likely to be clear and limpid, and on microscopic examination no pus or epithelial cells are found.

The urine of cystitis is characteristic, and a diagnosis can usually be made from a microscopic examination. A recently voided specimen appears turbid, and if the inflammation is acute it may be tinged with red. On standing a thick tenacious yellow sediment forms at the bottom of the vessel, and if red corpuscles be present a thin reddish strata is observed superimposed upon the lower or yellowish strata; above this the urine may be clear or slightly turbid. The specific gravity is valueless as a point in the diagnosis, as it may range between 1010 and 1030. On pouring the urine, after standing for a few hours, from one vessel to another, the sediment may be so tenacious as to adhere closely to the bottom. Albumen is found in varying quantity, depending upon the amount of pus present. If the inflammation is acute, the reaction is usually acid; but if chronic, it will in the larger proportion of cases be neutral or alkaline. On microscopic examination the field is filled with pus-cells, pavement epithelium, isolated or in clumps, and in the acute cases red blood-corpuscles. Fine strands of mucus are often seen in which pus and red corpuscles are entangled. In the chronic forms of cystitis a large number of crystals, usually of the phosphatic salts, are often observed.

The urine may be excessively fetid and ammoniacal when voided, due to the introduction of bacteria into the bladder.

In those cases in which epithelium from the ureter and pelvis of the kidney are found, the ureteral catheters should be employed to establish the diagnosis, to determine definitely the extent of the inflammation in these organs, and whether only one or both ureters and kidneys are affected. If a vesical calculus or tumor be suspected, the sound or cystoscope should be employed.

In diphtheritic cystitis the constitutional symptoms, in conjunction with the odor of the urine, which becomes excessively fetid, are usually sufficient to indicate the character of the inflammation.

PROGNOSIS.—In the milder forms of acute cystitis arising in the course of pregnancy, or as the result of chemical or mechanical causes, or from slight infection, the duration will usually be from five to ten days. The prognosis as to the duration of cystitis always depends upon the cause, and until this is definitely settled it is not advisable to make any statement with regard to the time of recovery.

Chronic cystitis is always intractable, and may last for years even under the most skillful treatment.

In diphtheritic inflammation and gangrene of the bladder naught but an unfavorable prognosis can be given, as these conditions are always exceedingly grave and treatment is of but little avail.

TREATMENT.—As a large proportion of cases of cystitis arise from the introduction of pyogenic organisms into the bladder, too great care cannot be exercised in the cleansing and sterilization of all instruments to be introduced into the bladder.

The mere sterilization of these instruments is not sufficient to prevent contamination, as recent bacteriological investigations demonstrate a large number of organisms, both pyogenic and non-pyogenic, in the vagina and about the urethral orifice; unless the external genitalia be carefully cleansed there is constant danger of infection from these parts. A glass catheter with smoothed ends should always be employed if available, as those made of rubber and metal are much more difficult to sterilize.

Each patient should have her own catheter, and in hospital practice it is a good plan to have a bottle labeled with the patient's name, in which the instrument is kept.

Before use the catheter should be boiled for at least five minutes, and transferred to a bottle containing a 5 per cent. carbolic-acid solution. The external genitals, especially about the urethral orifice, should be carefully washed with a saturated solution of boracic acid before catheterization, which is best applied with a pledget of cotton on the end of application forceps. In this way the nurse, who may have come from a septic case or whose hands may be contaminated, avoids all risk of infecting the bladder. The labia are separated with the thumb and forefinger of one hand, care being used not to touch the parts near the urethra, and the catheter inserted. Before removing the catheter the finger should be placed over the end, and thus prevent the urine from escaping over the parts when it is withdrawn. It should be at once cleansed in boiling water and placed in its receptacle. If this routine be followed, cystitis during the puerperium or after operation will rarely arise. If a rubber catheter be used, it should be opened at the end, as it is very difficult, if not impossible, to cleanse one which has a closed end with eyes on the sides. Operative and puerperal cases should be carefully watched to prevent retention, and the patient's word must not be taken with regard to the voidance of her urine, as from motives of delicacy or from ignorance she may not inform the physician of her urinary troubles.

The first requisite in the treatment of cystitis is rest, and to accomplish this the patient must at once go to bed and lie in the recumbent position. All stimulating foods, such as meats, highly-seasoned dishes, alcoholic beverages, especially those containing a large percentage of alcohol, should be avoided. It is best to restrict the diet to milk or light broths. Saline cathartics should be administered, and later care must be used to keep the lower bowel free from fecal accumulation. Warm enemata are useful, not only as a means of evacuating the bowel, but also as a soothing agent. Hot sitz-baths usually relieve the tenesmus and vesical fullness. If the pain is severe, an enema of 30 drops of tincture of opium in 2 ounces of starch-water may be employed, or opium may be given in suppository. Sometimes an iodoform or belladonna suppository will relieve the pain. Hot compresses should be applied over the bladder. Cups applied to the sacrum are often useful in relieving tenesmus and the sensation of fullness.

To allay the fever and keep the urine bland and unirritating the following prescription will prove of value:

℞. Tinct. aconiti, fʒj;
Spirit. æther. nitrosi, f℥ij;
Liquor potassii citratis, q. s. ad fʒvj.—M.
Sig. A dessertspoonful every four hours.

Benzoate of ammonia, in the dose of gr. x every two hours, has been highly recommended.

In acute cases which are of septic origin irrigations of the bladder should be at once instituted, as the removal of the infecting agent is of prime importance.

The solutions used in washing out the bladder are numerous, but those which have been of greatest value are boracic acid (50 per cent. to saturated solution), weak solutions of permanganate of potash, bichloride of mercury (1 : 10,000), and silver nitrate (1 to 4 gr. to the ounce).

The following is the best manner for irrigating the bladder: A glass catheter should be attached to an ordinary or fountain syringe by means of a rubber tubing or small soft-rubber catheter. The temperature of the water should be 100° to 105° F. The same precautions in cleansing the external genitals should be observed in irrigations as in catheterization. The patient lies in a recumbent position with the hips slightly elevated, resting on a bed-pan. The solution is allowed to flow before introduction of the catheter, when the rubber tube is pinched up, thus preventing the introduction of air into the bladder. A sufficient quantity of the solution is permitted to flow into the bladder until slight distension is produced or the patient complains of pain. The fluid is allowed to remain for a few seconds, when it is withdrawn by detaching the rubber tubing from the catheter. The irrigations should be repeated until the fluid flows away clear. At first the patient will probably not be able to stand more than one irrigation daily, but after one or two days she becomes accustomed to the treatment, and if the case is badly infected, the bladder can be washed out thrice daily. Boracic acid is always the best solution to commence with, as it is free from danger and is less irritating than bichloride of mercury or silver nitrate. Repeated hot vaginal douches are very beneficial.

The treatment of chronic cystitis differs in many respects from that of the acute inflammation. The mucous membrane of the bladder, instead of being functionally over-active as in the acute form, is depraved and its function largely destroyed by the chronic inflammation. For this reason stimulating injections and internal remedies must be employed with the hope of bringing into activity the depraved mucous membrane. It is in these cases that the solutions of bichloride of mercury and silver nitrate will be of greatest service. More than two irrigations daily with these solutions should never be given. If the pain after the employment of silver nitrate is excessive, a 5 per cent. salt solution may be injected, which precipitates the silver nitrate in the form of an unirritating chloride of silver.

The reaction of the urine must be carefully noted, and if decidedly alkaline or acid, remedies should be employed to neutralize or make it of the opposite reaction. Within the last year iodoform in the form of an emulsion (50.0 iodoform; 40.0 glycerin; aq. destillat. 10.0; mucilago acaciæ q. s.) has been highly recommended as an injection, and should be tried if the solutions just advised fail to relieve the patient. Resorcin solution (2 per cent.) may also be employed in obstinate cases. Benzoic or boracic acid, in the dose of ten grains made up in pill form with glycerin, is the best drug for converting an alkaline into an acid urine. Citrate of potassium is one of the best remedies to be employed when the urine is acid.

If, as in many cases, the treatment fails and the pathological process grows worse, it may be necessary to secure constant drainage of the bladder by means of dilatation of the urethra, by vesico-vaginal fistula, or by the use of a self-retaining catheter.

Dilatation of the urethra may relieve the tenesmus and secure drainage for a short time, but at best is but a temporary measure, and must be repeated a number of times if it is to be of value; for this reason it is not, as a rule, practicable. It may be accomplished either gradually by the use of a hard-rubber graduated bougie or rapidly by the aid of Goodell's small uterine dilator. The danger of urinary incontinence must always be borne in mind, as over-dilatation may result in permanent incontinence. The use of a self-retaining catheter is only to be employed when operative measures are refused.

The best plan is drainage through a vesico-vaginal fistula. Emmet advises the opening to be made as follows: "The patient is etherized and placed in the Sims position, and the perineum well retracted; a sharply-curved sound is passed into the bladder and its beak pressed against the septum, so as to protrude in the median line a short distance behind the vesical orifice: it is then cut down upon by the aid of tenaculum and scissors. The blunt blade of the latter is inserted through the opening into the bladder, and the incision prolonged 3 or 4 cm. in the direction of the cervix uteri. Care must be taken that the blade of the scissors really enters the bladder, since it is apt to penetrate the loose cellular tissue between the vesical and vaginal membranes, and thus the latter only is incised. The edges of the incision should then be cauterized, or the vesical and vaginal membranes united by a continuous suture, to prevent the fistula from closing; the same end may be furthered in a measure by instructing the patient to pass her finger into the opening every night and morning. Any troublesome hemorrhage at the time of operation may be at once arrested by passing a deep transverse ligature through the upper or lower angle of the incision, according to the direction from which the blood comes; any such measure will, however, be rarely demanded."

The actual cautery may be used in making the fistula. After the opening is established the vagina should be douched at least twice daily with boracic-acid solution, and all parts with which the urine may come in contact must be anointed with cold cream or vaseline.

The bladder may be irrigated as before, allowing the fluid to flow through the fistula into a bed-pan. As the fistula must be kept patulous until the cystitis is cured, which may require months, it will be necessary to have the patient wear some form of ambulatory urinal, which can be obtained at any instrument-maker's. After all symptoms have disappeared the fistula can be closed in the manner described in the article on that subject.

TUBERCULOSIS OF THE BLADDER.—Tuberculosis of the female bladder is exceedingly rare, Birch-Hirschfield having found only 4 cases in 2565 autopsies upon women in the Dresden Hospital.

The tuberculous process is usually secondary, the primary focus being in the lungs or kidney or part of a disseminated miliary tuberculosis. Primary tuberculosis of the bladder is rare—at least the diagnosis has not been made frequently, possibly because of difficulty in the past of detecting tubercle bacilli in the urine. Now that improved methods of staining bacilli in the urine have been introduced, this viscus may be more frequently found to be the primary seat of tuberculosis.

PATHOLOGY.—The mucous membrane in the early stage of tuberculosis of the bladder is dotted over indiscriminately with pearly nodules about the size of a millet-seed, which are easily distinguishable from the surrounding tissue. Each tubercle conforms to the general type of those found in the lungs. These nodules gradually enlarge and coalesce, forming grayish-white areas with caseating centres.

Soon these patches break down into ulcers which may be localized or involve the entire mucous membrane. Isolated ulcers may penetrate the superficial layers of the bladder and in rare instances perforate the wall.

DIAGNOSIS.—As the symptoms of tuberculosis closely simulate those of chronic cystitis, it is often difficult or impossible to differentiate the two conditions. In all cases of cystitis coming on insidiously and without apparent cause tuberculosis may be suspected, and a careful examination of the lungs should be made to discover if they are the seat of primary infection. Having excluded the lungs, the kidneys should be carefully examined. It is in these cases that the ureteral catheters are of great value. The method of catheterization of the ureters, as described in the article on that subject, should be followed. The specimens of urine obtained by this means should be examined for tubercle bacilli.

The Demonstration of Tubercle Bacilli in the Urine.—The sediment from the suspected urine is obtained from the bottom of a conical glass after the urine has stood for some time, or better still, by centrifugalization. Drops of this are spread out in a thin layer on several cover-slips, as in the examination of sputum, or, as the bacilli are often few in number and it is desirable to examine a large surface, some of the sediment may be spread out on an ordinary microscope slide; after being spread the film is allowed to dry in the air, and the cover-glass or glass slide afterward passed quickly three times through the flame of a Bunsen burner or an alcohol lamp. Care must be taken not to overheat the specimen; this may be avoided, as a rule, by holding the cover-slip between the fingers while passing it through the flame.

The best method of staining for general use is that of Gabbett, a modification of the Ziehl-Neelson method. A few drops of the following solution—

Fuchsin, pure,	1,
Acid. carbolic.,	5,
Alcohol, absolute,	10,
Aquæ destillat.,	100,

are poured on the cover-glass, which is then held in fine forceps over the flame, and heated to boiling for from one-half to one minute; the excess of stain is washed off with water, and the cover-slip immersed for a moment or two in a combined decolorizing fluid and counter-stain (sulphuric acid pure 1, distilled water 3, methylene blue to saturation).

The specimen is immediately washed off in water, and if insufficiently decolorized, again immersed in the decolorizing fluid. After washing in water, the cover-glass is placed between two folds of good filter-paper to remove the excess of water; the glass is thoroughly dried high above the flame, and finally mounted in a drop of xylol balsam.

A good oil-immersion lens ($\frac{1}{12}$ or $\frac{1}{14}$) is required for the examination. Sometimes the bacilli are numerous, but in many cases there are very few, and it may be necessary to look carefully through many preparations with the aid of a mechanical stage before finding them. It is necessary to warn against the use of old cover-slips, since when they have been used for tuberculous specimens before, unless the greatest care has been exercised in cleaning them, a few tubercle bacilli may have remained which would lead to the making of a false diagnosis.

In the early stage the cystoscope may reveal the miliary nodules or the localized caseous area, or later the tuberculous ulcers may be seen, and thus the extent of the process determined. As a rule, however, the cystoscope is of little value, as the urine is so clouded with blood. If tubercle bacilli be found in the urine, and other organs are not the seat of primary infection, the diagnosis is definite; but frequently a cystitis which seems to be the result of a localized tuberculosis will prove upon catheterization of the ureters to be an extension from the kidneys.

PROGNOSIS.—The prognosis in tuberculous cystitis is always unfavorable. The process may be slow in extension, the patient dying from the ulceration of the bladder, or from extension to other organs, or from general miliary tuberculosis.

TREATMENT.—If the infection of the bladder be primary, the tuberculous areas should be treated by means of injections or by a cystotomy and curettement. If the bladder is opened, it should be done in the manner described in the article on Cystitis. The tuberculous patches should be thoroughly curetted. It is best to allow the vesical fistula to remain open for some time, as free drainage is afforded, and if necessary local remedies may be applied to the diseased area. If the tuberculous cystitis be but secondary or a part of a general tuberculosis, irrigation of the bladder may be resorted to as a palliative measure.

A treatment which has been frequently recommended during the last year is by injections of iodoformized oil or glycerin. The following formula has been recommended:

℞. Iodoformi,	50.0;
Glycerini,	40.0;
Mucilag. acaciæ,	9.5.

Sig. Use as an injection thrice daily.

At first it is best to start with one injection daily. The emulsion should be carefully mixed, as there is a tendency for the iodoform to collect in small balls in the bladder, which might form the nuclei of calculi.

The general nutrition of the patient should be carefully looked into, and the remedies for tuberculosis of the lungs, along with a generous diet and a proper hygienic regimen, should be prescribed.

Vesical Calculus.—Vesical calculi rarely occur in women because of their patulous and short urethræ. Renal calculi which are expelled into the bladder, and in men usually form the nucleus for a much larger stone, are in women swept out at the first micturition. It is probably very seldom that a stone descends from the kidney and remains a sufficient time in the female bladder to gain by accretion a size which prevents its expulsion through the urethra. The fact that the largest proportion of calculi in women are discovered after the repair of vesical fistulæ goes to prove that they are formed in the bladder, and are not simply the enlargements of stones from the kidney. After vesico-vaginal operations if the stitches are allowed to pass through the mucous layer of the bladder, it is probable that the nidus for the stone may be furnished by the exposed suture. Emmet claims that such operations are the most frequent source of stone in women. Calculi may be of various kinds, as uric acid, triple and amorphous phosphates, oxalate of lime, or cystine. Phosphatic stones are more frequent in women than in men, while those of uric acid are less frequent. It is rather difficult to account for this difference in their occurrence in the two sexes, but it is probably due, as explained by a number of writers, to the more frequent tendency of men to a gouty or lithemic diathesis. Foreign bodies introduced for various purposes by hysterical women may form the nucleus of a stone. Thus, hair-pins, bits of wax, buttons, beans, etc. have been found as the centre of vesical calculi. Usually the bladder contains but a single calculus, but occasionally two or more are found. The most common shape is a flattened ovoid, although they may be somewhat rectangular or irregularly rounded, while phosphatic stones are occasionally curiously branched.

On account of the patulous urethra in women, calculi of small dimensions are rarely found; they vary from the size of a pea to that of a walnut and are often much larger. The density of the calculus depends upon its chemical composition, the phosphatic variety being the most friable and easily crushed. The situation of the stone varies with the position of the patient. When she is in an upright position, it will usually be found at the base of the bladder or blocking the orifice of the urethra, but if recumbent the stone will drop back toward the fundus. It may be encysted or caught by a fungous mass or retained between the rugæ of an hypertrophied bladder-wall. If there be a diverticulum in the bladder, as is often seen accompanying prolapsus uteri, the stone will be found at the bottom of this sac. Occasionally it is lodged in the orifice of an ureter. The author removed a stone within the last two years which he had previously located in the mouth of the left ureter by means of the ureteral sound.

Etiology.—The causes of calculi are obscure. The reason for the deposit of urinary salts about a foreign body is perfectly patent, but the origin of a stone in the centre of which no foreign body can be found is not so clear.

In those cases of prolapsus uteri in which a vesical diverticulum exists, calculi are prone to form, as these sacs usually contain residual urine in which there is a considerable deposit of mucus. When one observes, under the microscope, the manner in which urinary crystals are often entangled in the shreds of mucus, it may quite as reasonably be expected that the same result will take place in the diverticulum of the bladder, thus leading to the formation of a calculus.

Symptoms.—The symptoms which are most characteristic of stone are frequent micturition, with sudden stoppage in the flow, hematuria, and pain. An irregular, halting, and painful flow of urine is, of all symptoms, the most characteristic. It usually occurs when the stone is small, and is sucked into the vesical mouth of the urethra, acting as a ball-valve. As it grows in size this tendency often entirely disappears. Frequent micturition is usually a constant symptom, the patient being compelled to void her urine many times during the day, especially when she is on her feet or doing active work. During the night this urgent and frequent desire to void the urine disappears, and the patient may pass a whole night without once getting up. Horseback riding or driving over rough roads often causes severe pain.

The pain in vesical calculus is of two kinds—that directly caused by the stone, and that produced by the cystitis which almost invariably follows as the result of vesical irritation. There is constant, heavy, dull pain over the pubes, radiating down into the legs and external genitalia and upward to the groin. The pain, which is characteristic, is sharp and lancinating, and occurs at the end of micturition, frequently being referred to the external genitalia, and is so severe at times as to cause the patient to scream. Violent straining accompanies micturition, and the attending pain may be referred to the rectum or perineum, especially if there are hemorrhoids or if prolapsus of the rectum exists, as frequently results from the straining efforts.

In little girls the pain may be entirely referred to the vulva, and lead to a habit of constantly dragging or picking at the parts, which causes hypertrophy and excoriation of the labia.

Hematuria is frequent, but is characteristic only when a few drops of bright-red blood appear at the end of micturition. Usually those elements only are observed in the urine which occur in cystitis.

DIAGNOSIS.—Any of the above symptoms may cause the surgeon to suspect stone, but a definite diagnosis is impossible until a careful exploration of the bladder is made. This may be done in one of three ways—by the sound (which is the best), by digital exploration, or by the cystoscope.

The same precautions should be observed in sounding for stone as in catheterization, as prolonged manipulation furnishes the best opportunity for the introduction of septic material, if the technique is not perfect. The patient should be placed in the lithotomy position, with the thighs flexed upon the abdomen. The vagina and external genitalia should be thoroughly washed with soap and water, then rinsed with boiled water, and then with bichloride-of-mercury solution (1 : 1000), and again with water.

A piece of gauze one yard square should be spread between the thighs over the buttocks, and a hole made of sufficient size to permit the free manipulation of the sound. It is also well to have the patient's legs enveloped in sterilized stockings or towels. By the observance of these small details the best aseptic technique is obtained. The bladder should be emptied of its urine, and partially distended with boracic-acid solution or sterilized water. The surgeon either stands or sits between the patient's thighs when introducing the sound, which should be previously warmed and anointed with sterilized vaseline. In sounding a definite plan should be followed: The base of the bladder should be carefully explored first, and then the sound should be caused to make excursions upward and to the sides. During this manipulation two fingers of the hand should be introduced into the vagina, and it will be almost impossible for a stone to elude the search.

If this examination be negative and the surgeon is still in doubt, he may resort to the cystoscope, or the urethra can be dilated to the size of the index finger and a digital exploration made. In this way an encysted stone may be detected. In chronic cystitis or where vesical neoplasms exist in the walls of the bladder, or in the presence of a tumor encrusted with urinary salts, a peculiar grating sound may be elicited by contact with a metallic instrument.

The main points of difference as elicited by the sound between this condition and stone is the extensive area of deposit and the lack of resistance when the instrument is pushed against it. The surgeon should always bear in mind that a calculus may be associated with a vesical tumor, a fragment of which has served as the nucleus of the stone.

Prognosis.—If the stone be detected early and removed before marked changes in the bladder have occurred, the prognosis is quite favorable. On the other hand, if cystitis exist associated with hypertrophy and contraction of the wall of the bladder, or if there is secondary disease of the kidneys, the prognosis is unfavorable, the patient often dying from protracted suffering or from the progress of the renal disease. This, however, is very rare, as the symptoms of stone are usually so urgent as to lead to its detection before such grave lesions occur.

Treatment.—There are three modes of treatment employed in cases of vesical calculi in women: by dilatation of the urethra and removal of the stone, if small, by forceps, or if large by crushing; by kolpo-cystotomy; and by suprapubic cystotomy. As the urethra is capable of considerable dilatation, the first method will, in a certain number of cases, be the most available. The urethra should not be dilated larger than the girth of a medium-sized forefinger, as the sphincter fibres may be lacerated, causing permanent urinary incontinence. After the urethra has been dilated the surgeon introduces his finger into the bladder and locates the stone. If not larger than the tip of the little finger, it may be grasped with delicate forceps and removed, or coaxed up to the neck of the bladder and out through the urethra by means of two fingers in the vagina. Should the stone be large, it is not advisable to remove it intact, as the urethra may be so overstretched that incurable incontinence will result.

Lithotrity is usually considered the best mode of treatment when the stone is not too large or too dense to permit of crushing. The patient is placed in the same position for this operation as when examined for stone. The urine should be withdrawn, and the bladder partially distended with tepid boracic-acid solution. The surgeon, sitting between the patient's thighs, introduces the lithotrite, previously warmed and anointed with sterilized oil or vaseline, into the urethra in a line almost perpendicular with the long axis of the body. The handle of the instrument is then depressed, when it gently glides into the bladder.

Two fingers of the disengaged hand should then be introduced into the vagina and the stone located. An assistant now opens the blades of the lithotrite, and with a little manipulation the stone will be seized, when the instrument should be very gently rotated to obviate the danger of catching the mucous membrane, and the screw slowly turned until the stone is crushed; this will be sudden or gradual according to its composition. The blades are then separated and again closed, catching one of the larger fragments, and so on until the stone is reduced to small particles. It is rarely necessary to resort to an evacuator, as repeated irrigations of the bladder are sufficient to remove the fragments. During the irrigations the bladder should be gently manipulated between one hand introduced into the vagina and the other placed above the pubes.

Every particle of the stone should be removed, as small fragments, if left behind, may form the centres of other calculi. If the stone be thoroughly pulverized, there is no danger of fragments being impacted in the urethra. In case, however, a part of the stone eludes the grasp of the lithotrite and later becomes impacted, it may be removed by means of delicate urethral forceps, or, if lodged in the mouth of the urethra, it can be pushed back with a sound and crushed with the lithotrite.

Urethral fever is not an infrequent complication following the introduction of instruments into the bladder, especially after lithotrity. It is characterized by the occurrence of rigors, with headache and vomiting, followed by febrile reaction. It is especially liable to occur in nervous women, but is not a serious complication, and usually passes off in one or two days. Temporary aggravation of the already existing cystitis may result from manipulation of the lithotrite.

Contra-indications to Lithotrity.—Lithotrity should not be resorted to in girls under thirteen years, as the urethra is too small to allow sufficient manipulation of the instruments, and as lithotomy is such a safe operation at this age, it should always have the preference. The size of the stones should be carefully estimated, as a stone of a greater diameter than one inch can be more easily removed by kolpo-cystotomy. In those cases of sacculated bladder occurring in prolapsus uteri or in cystocele, lithotrity is not practical, as small particles of the calculus are likely to be left in these dependent pouches. Chronic cystitis usually coexists in these cases, for which reason cystotomy is preferable, as we thus not only remove the stone, but also secure free drainage, which will often be necessary to cure the accompanying inflammation of the bladder.

If the calculus be associated with a vesical neoplasm, lithotrity is contra-indicated, as the manipulation of the lithotrite might induce a profuse hemorrhage, and the removal of the stone, if the tumor be left behind, would give little or no relief.

Cystotomy is the next operative measure to be considered if removal of the stone through the urethra be contra-indicated. In women kolpo-cystotomy is almost invariably the operation of preference, as it is comparatively easy and free from danger, and is applicable to the largest number of cases. This operation is best performed according to Emmet's method, as follows: A sharply-curved sound is introduced into the bladder so as to depress the vesico-vaginal septum. The vaginal side of the septum is then caught with a tenaculum and a small opening made, which may be enlarged with scissors by cutting upward toward the cervix, keeping in the median line and thus avoiding the ureters. If there is only a mild grade of cystitis, the fistula should be closed immediately after extraction of the stone; on the other hand, should the cystitis be chronic, with considerable pus and exfoliated epithelium in the urine, the opening should be left, thus securing constant drainage.

Suprapubic cystotomy is rarely necessary, but may be required in those cases in which the stone is too large to admit of vaginal lithotomy. Greater care is necessary in opening the abdomen of women than of men not to wound the peritoneum.

The treatment after all operations for stone is simple. In those cases in which the fistula is left open or in which dilatation of the urethra is performed, the bed should be well protected with old linen, as there will be a constant discharge of urine.

The parts with which the urine is liable to come in contact should be anointed with vaseline, and if there is any tendency to the formation of incrusted urinary salts, the parts should be gently scraped and anointed with oxide-of-zinc ointment. A light diet must be insisted upon, and the urine kept bland by means of an abundant ingestion of pure water. Citrate of potash should be administered if the urine is acid, and benzoic acid if it is alkaline. The patient should return to the surgeon for examination at least once every year after the removal of a calculus, to ascertain if there be any recurrence.

TUMORS OF THE BLADDER.—The most frequent form of tumor occurring primarily in the bladder is the *vascular-papillomatous fibroma.* It usually arises from the superficial layers of the mucous membrane, then branches out into slender villous processes, each of which is composed of a delicate stroma containing loops of blood-vessels. The papillæ may be long, or short and velvety. The surface is covered by stratified epithelium. From its delicate and friable character this growth is frequently the seat of hemorrhage, as the slighest traumatism may cause bleeding. This tumor ranges in size from 2 to 7 cm. in diameter, and may even be larger.

The most frequent site for papillomatous fibromata is toward the base of the bladder at the orifices of the ureters or near the urethra. According to Ziegler, this growth should not be described as a "cancer," as it does not belong to the group of malignant tumors.

Carcinoma of the bladder very rarely occurs as a primary growth, but is usually a direct extension of the pathological process from the rectum, vagina, or uterus. Primary cancer may, however, arise in any part of the bladder, and take the form of a nodular or fungous tumor. It grows rapidly, and soon becomes necrotic, breaking down into ragged, ulcerated areas which may perforate the bladder-walls.

Other neoplasms are exceedingly rare, yet any one of the following may occur: myoma, fibro-myoma, myxoma, sarcoma, fibrosarcoma, adenoma, and, very rarely, dermoid cyst. Polyps also occasionally arise from the vesical mucous membrane. Hypertrophy of the bladder-walls, which may assume a polypoid form, usually occurs as a result of chronic cystitis, and will be spoken of under that heading.

SYMPTOMS.—In the early stage of any neoplasm the symptoms are not pathognomonic, usually simulating those of cystitis or vesical calculus. The first symptom usually noticed is painful micturition, caused by the irritation or mild cystitis which is set up by the growing tumor. In the papillary growth, however, a sudden hematuria may be the first symptom.

If the new growth be near the internal urethral orifice or is pedunculated, urination may be difficult and halting, as in vesical calculus, or if the tumor becomes lodged in the urethra, there may be retention. As the growth increases in size, the pain experienced during micturition grows more intense, and continues for an hour or more afterward. There is heavy, dull pain over the bladder, which radiates into the legs, upward toward the inguinal and lower lumbar regions.

By this time hematuria occurs if it has not occurred before. The urine is at first only slightly tinged with blood or may be of a bright-red color, due to a sudden and profuse hemorrhage. Days may pass, and the urine be comparatively normal before blood is again noticed. The sudden hemorrhages occurring in the papillary growths often seem to be entirely free from traumatic causes, the patient, perhaps, awakening in the night with a desire to void her urine, and finding that it is almost pure blood. The cystitis, which is at first mild, becomes more intense as the tumor increases in size, and the urine, which has been acid, gradually becomes neutral, and later intensely alkaline.

There is in many cases a constant desire to micturate, resulting in small quantities of bloody urine being voided. As the alkalinity of the urine increases, the urinary salts are precipitated, and may form incrustations on the tumor. On examining a freshly-voided specimen of urine, it will usually be found to have a light or dark reddish opacity. After standing for a few hours, the supernatant urine frequently does not clear up. This may be due to micrococci, or schizomycetes, which are found in myriads. There are usually two strata of precipitate—an upper red or tenacious, and a lower or yellowish. If the alkalinity be quite decided, the urine will be loaded with a thick, tenacious mucus. On microscopic examination there are observed a large number of red and white corpuscles, and if the specimen has been lately voided, these cells will be only slightly changed in form. The appearance of the urine in these cases differs from that of cystitis only in the larger number of red corpuscles and the fragments of the neoplasm if present. The odor of the urine is usually ammoniacal and excessively fetid. If the tumor be malignant, the symptoms are more rapid in their onset, and the termination much more quickly fatal.

In papillary growths and other benign tumors the hemorrhage from the bladder may be so excessive as to cause a grave secondary anemia resembling closely the cachexia of malignant tumors.

If nothing be done to arrest the growth of these tumors, the patient becomes emaciated, defecation may be excessively painful, the pain in the vesical area and in the lower lumbar region is intense, and she has the general appearance of one suffering the severest pain. In no disease is there more pain than in some of these cases, while others may be comparatively free from discomfort for many years.

Diagnosis.—In rare cases, in which hematuria is the only symptom at the onset of the growth, a diagnosis is impossible, on account of the many conditions which may give rise to blood in the urine, as the filaria sanguinis hominis, the plasmodium malariæ, and various diseases of the blood. As this symptom is rarely unaccompanied by others which point more or less directly to the disease, it is best to consider it in conjunction with them.

In cystitis the red corpuscles are much fewer and less frequently shed, and the fragments of tumor, of course, never observed. The onset in cystitis is more acute, and usually disappears if judicious treatment be instituted. The symptoms of vesical calculus may be exceedingly difficult to differentiate, as a tumor situated near the beginning of the urethra may give rise to symptoms so closely simulating those of stone as to render a diagnosis impossible without the use of the sound or cystoscope. In rare cases the two conditions may be associated, and the presence of the stone detected, while the tumor is entirely overlooked.

If a sound be introduced, it should be manipulated with the greatest gentleness, a violent hemorrhage often arising if the tumor be harshly touched. The ease with which the hemorrhage starts is a strong point in favor of tumor. If the growth be large, its outlines may be made out, but this is rarely reliable, as the hypertrophied mucous membrane arranged in folds may be easily mistaken for a tumor.

Small fragments of the growth may be dislodged, which at once renders the diagnosis clear. If the presence of stone be excluded and the diagnosis be still in doubt, it is well to dilate the urethra with Hegar's dilators, introduce the fingers, make a careful digital exploration, and thus arrive at definite conclusions.

Should a tumor be present, it is always desirable to know its nature, whether benign or malignant, sessile or pedunculated, localized or diffuse. A small piece should be removed for microscopical examination by snipping it off with scissors, or by curettement with the finger-nail or an ordinary uterine curette. In skilled hands the cystoscope may render a diagnosis easy, and it is in these cases that this instrument has done its most brilliant work.

Prognosis.—Carcinoma of the bladder is invariably fatal, and terminates the patient's life in from six to eighteen months. Benign tumors, if removed early, are usually followed by recovery. If, however, they are allowed to remain until a grave cystitis has been induced and the patient has become pale and emaciated, the prognosis is not so hopeful, as at best the recovery will be slow. Pyonephrosis, purulent ureteritis, or hydronephrosis may have resulted from pressure or occlusion of the ureters, in which case death is the most likely termination. If the benign tumor be thoroughly removed, there will be no return. In many cases the growth recurs on account of the failure in complete extirpation, due to insuperable difficulties from the impossibility of gaining complete access to all parts of the bladder.

Treatment.—There are three avenues of approach for the removal of tumors of the bladder—through the urethra, through a vaginal incision, or through a suprapubic incision. The first is always to be preferred if the tumor is not too large.

The urethra should first be well dilated with Hegar's dilators, running up as high, in carefully watched cases, as No. 23. The index finger may now be introduced and the bladder carefully explored. If the tumor be pedunculated, it can be grasped with artery forceps and removed by torsion. In case it be larger and have a broad base or pedicle, the écraseur may be employed to crush it off. In some cases the tumor may be caught with toothed forceps and brought down to the urethral orifice, where its pedicle can be transfixed and tied off and the mass removed with scissors or knife. If the tumor be sessile and spread out over the mucous surface as a velvety growth, it is well to resort to the curette or, as has been done in some cases, the finger-nail. Hemorrhage is rarely free or persistent, as the removal of the villous growth with its abundance of delicate blood-vessels takes away the source of hemorrhage. If, however, the bleeding persist, the bladder may be irrigated with warm water, and if this does not control it, the bladder can be illuminated and the bleeding point touched with some styptic, as Monsel's solution. Styptics are to be avoided if possible, as they cause superficial necrosis and firm black clots, which keep up a disagreeable discharge for many days. The introduction of small pieces of ice, or a saturated solution of boracic acid, or packing the vagina tightly with gauze, with counter-pressure above the pubes, may be resorted to should other means fail to control the hemorrhage.

If the tumor be too large for removal through the urethra, vaginal cystotomy (kolpo-cystotomy) should be performed. The incision should not encroach on the sphincter vesicæ, although its division need not result in incontinence of urine if it be promptly united. In the majority of cases the tumor is easily removed, as the operator gains ready access to its site through the vaginal opening.

If the tumor be malignant, it can be curetted and lightly cauterized, which will greatly alleviate the patient's suffering.

If urination is painful and a high grade of cystitis is present, it is best not to close the vaginal incision, as free drainage of the bladder adds greatly to the patient's comfort. It is rarely necessary to resort to suprapubic cystotomy in the female for removal of tumors. Baker, of Boston, makes the statement that suprapubic cystotomy has never been done in the female for vesical neoplasm.

After removal of the growth a daily douche of boracic acid (8 to 12 gr. to the ounce), at a temperature of 110° F., may be given. In this way the bladder is cleared of residual urine and the débris thrown off from the granulating surfaces. The urine should be kept bland and unirritating by a liberal ingestion of lithia or other pure water, and in addition potassium citrate or boracic and benzoic acids may be administered. Following dilatation of the urethra there will be urinary incontinence for days, and even weeks, until the circular muscles regain their normal tonus. If the patient suffer excessively, belladonna, iodoform, or opium suppositories may be employed.

If the vaginal incision be closed immediately after the tumor is removed, it will be necessary to catheterize every two hours for the first twenty-four, and every three or four hours thereafter. A self-retaining catheter is not necessary.

Inversion of the Bladder.—This is a rare affection, and but few cases are reported.

The protruding vesical wall is readily reduced if not strangulated, but is apt to re-descend if some measure is not instituted to retain it in position. In one case reported the protrusion of the invaginated bladder appeared so much like a red vascular tumor as to cause the surgeon to make all preparation for its excision. At the last moment the orifice of a ureter was discovered, and led to the proper diagnosis.

This condition, like prolapsus of the urethra and rectum, is found most frequently in children. It is usually of gradual formation, descending slowly and equably dilating the urethra. When the bladder first appears at the external orifice of the urethra, it resembles the prolapsed urethral mucous membrane; later, however, it becomes larger and larger, until the entire organ may protrude. Violent expulsive efforts of any kind are the exciting causes.

Symptoms.—Partial prolapse into the urethra before the bladder appears at the external meatus is said to be attended by symptoms similar to those of vesical calculus. A more extensive prolapsus usually gives rise to expulsive efforts and abdominal pain in the adult, but in children it is usually painless, and the presence of the tumor first calls attention to the condition. The tumor is of varying size, from that of a marble to that of an orange.

Diagnosis.—The diagnostic point between prolapsus of the urethra and bladder is the continuation of the prolapsed mucous membrane in the former with the vestibular mucous membrane. In prolapsus of the bladder a fine probe can be passed into the urethra alongside of the protruding membrane, while the same maneuver is not possible if only the urethra has descended. If the prolapsus is marked, the ureteral orifices may appear external to the meatus, when the urine will be seen flowing from their orifices in little jets. In vesical or urethral polyp the pedicle would serve to differentiate these two conditions, but if this is not sufficient for diagnosis, the polyp can be returned into the urethra; if reducible, it can still be felt by digital examination, while such would not be the case on reduction of the prolapsed bladder.

TREATMENT.—The patient should be placed in the lithotomy position, and the bladder returned in the same manner as a hernia is reduced. This is usually effected with great ease, but the prolapse may return of its own accord when the patient assumes the recumbent position.

The patient should rest in bed for at least one week. Often there is slight or no relaxation of the urethra; in such cases little is indicated further than postural treatment. If there is great relaxation of the urethra, with incontinence of urine, it may be necessary to narrow its caliber by an operation through the urethro-vaginal septum. This may be accomplished by means of the linear excision of a portion of the urethral wall, followed by closure with sutures of fine silk or silkworm-gut. Some writers recommend linear cauterization within the urethra, thus narrowing the caliber by the subsequent formation of cicatricial tissue.

In all cases there is a liability to permanent incontinence.

DISEASES OF THE URETERS.

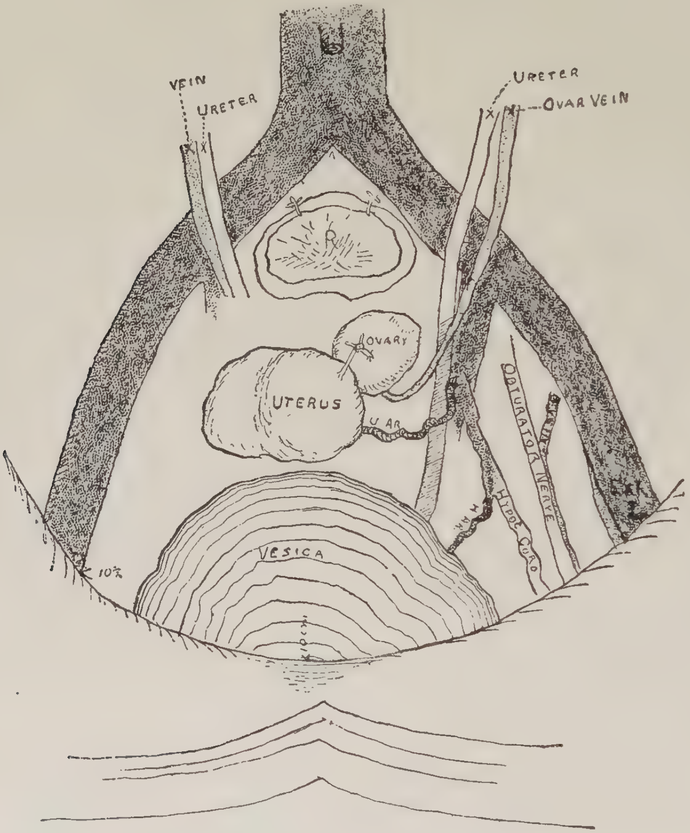
The ureters are liable to ascending disease from the bladder or to secondary involvement or descending disease from the kidney; to intrinsic disease, which begins primarily in the ureter itself, or, again, to involvement between its renal and vesical terminations by continuity from the disease of some neighboring organ.

One or both ureters may be affected, and, according as one or both are involved and to the gravity of the affection, the prognosis varies. A serious affection of both ureters is incompatible with long life, as secondary changes sooner or later occur in the respective kidney or kidneys interfering with the excretion of urea.

Diseases of the ureters have only recently begun to attract that attention which their importance demands, and although the therapeutic means at our command are far behind our diagnostic precision in the female, the former are making rapid strides.

The DIAGNOSIS of disease of the ureters is made by recognizing alterations in the caliber of the ureter; thus in inflammatory disease, whether intrinsic, arising from extension of inflammatory disease upward from the bladder, or downward from the kidney, the ureter of the affected side becomes enlarged (ureteritis) and in more violent forms of inflammation the surrounding connective tissue is also involved (peri-ureteritis). The normal ureter can be palpated in four cases out of five through the antero-lateral wall of the vagina in its upper third, where it is felt to roll under the finger like a small soft cord. By pressing down through the superior strait with the disengaged hand the examination is often greatly facilitated.

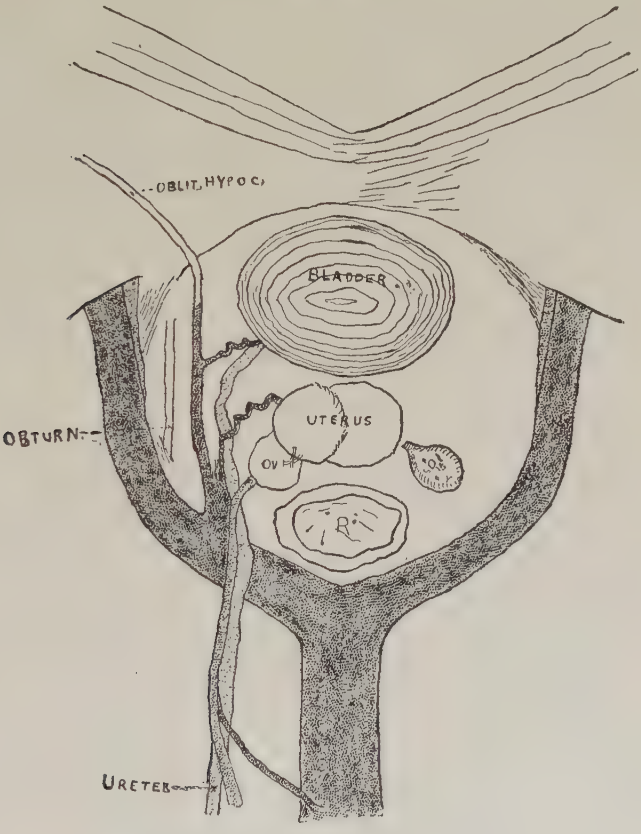
FIG. 354.



Pelvic Portion of the Ureter viewed from below.

An enlarged ureter gives the sensation to the finger of a rigid cord, or even of a lead-pencil. It is always very sensitive upon pressure, which usually produces a strong desire to urinate; this is especially characteristic of affections in the lower part of the ureter. Behind the broad ligament an enlarged ureter may be mistaken for an adherent and sensitive ovary. Back of this point the normal ureter cannot be traced, unless a catheter is first inserted through the bladder and carried up to the pelvic brim. The ureter may then be readily felt upon the catheter by a finger introduced into the rectum. An enlarged ureter can readily be felt *per rectum* from the broad ligament up to the pelvic brim. The course of the ureter in the upper part of the pelvis usually lies to the inside of the internal iliac artery, which can be palpated. It occasionally lies on the other side of the vessel. The only point at which the ureter can be palpated distinctly in the abdomen is over the brim of the superior strait. The landmark for the point at which it

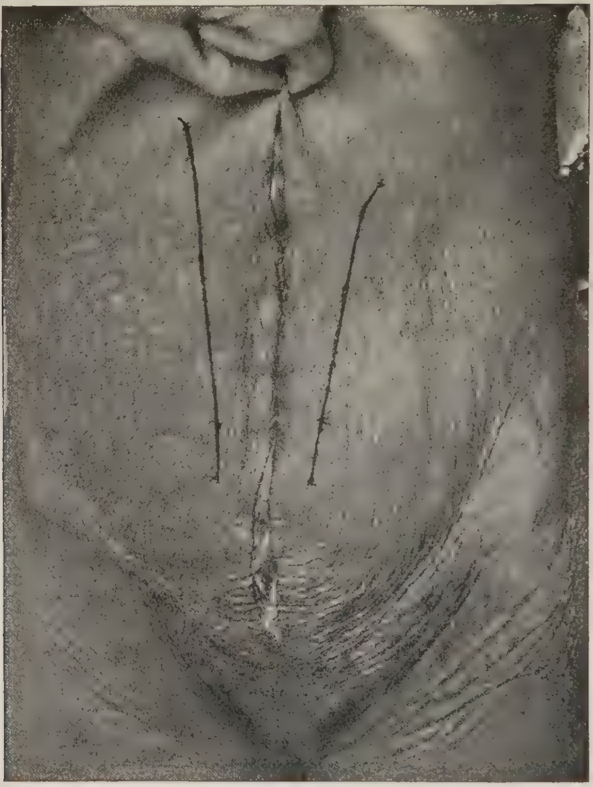
Fig. 355.



Pelvic Portion of the Ureter viewed from above.

crosses the brim is located by first making deep pressure upon the promontory of the sacrum. A little below this point, and from 2.5 cm. to 3 cm. on either side, the common iliac artery will be felt, at which point the ureter crosses it to drop into the pelvic cavity. Above this point an inflamed ureter may sometimes be located by a line of tenderness on pressure.

FIG. 356.



Course of the Ureters marked on the Abdomen.

Sounding and Catheterizing the Ureters.—A sound or a catheter can be introduced into one or both ureters in the following manner: The patient is brought with her buttocks to the edge of the table, the legs and thighs being sharply flexed. The vulva and vagina are cleansed with soap and water. The urine in the bladder is drawn off and put to one side. The bladder is then injected with 150–200 cc. of a methyl-blue solution. The posterior wall of the vagina is now retracted with a Sims or a Simon speculum which exposes the anterior wall. On close inspection two prominent folds will be seen

PLATE XXXVII.

FIG. 1.

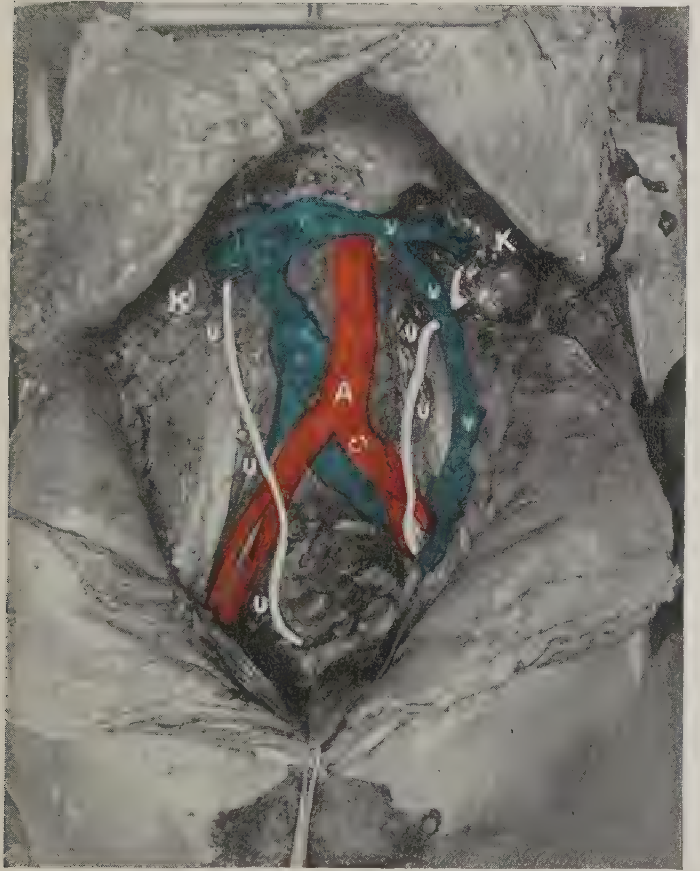
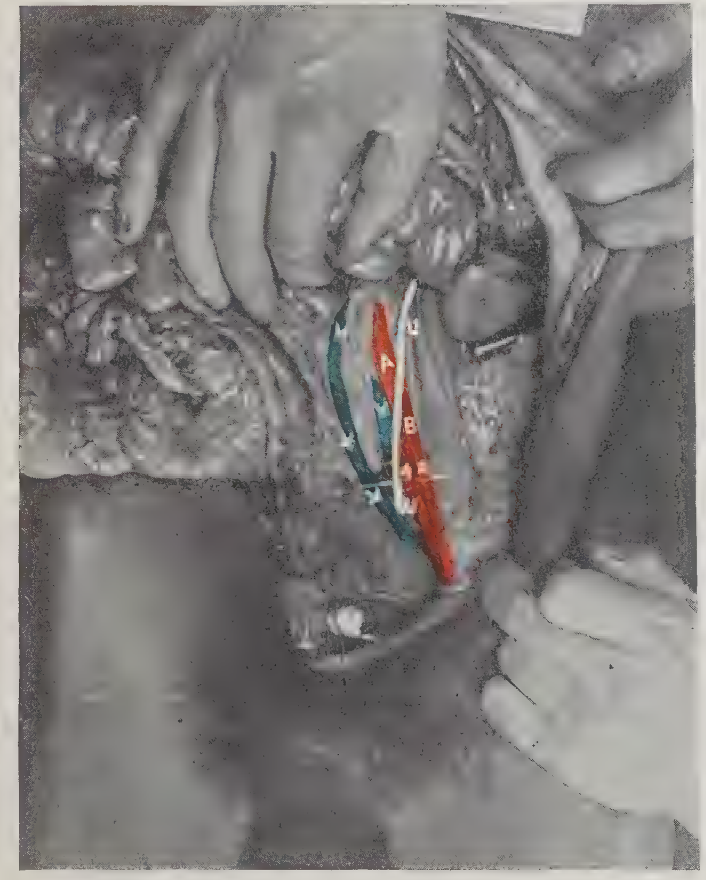


FIG. 2.



COURSE OF THE URETERS AND PELVIC BLOOD-VESSELS.

FIG. 1.—*A*, abdominal aorta; *CI*, common iliac arteries; *U, U, U*, ureters; *V*, renal vein; *K*, kidney.

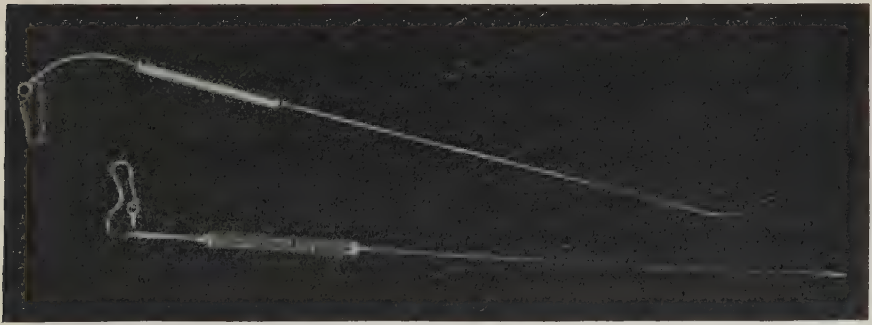
FIG. 2.—*U, U*, ureters; *B*, bifurcation of the common iliac artery; *A*, common iliac artery; *A, A*, internal and external iliac arteries; *V*, common iliac and mesenteric veins.

sweeping over the anterior wall about halfway up, and out to the sides on to the lateral walls toward the cervix. These are the ureteral folds, so called by Pawlik, the pioneer in this work. Parallel to, and just above these folds the ureters are to be sought. One of Kelly's ureteral sounds is now taken in hand, introduced through the urethra into the bladder, and held with the concavity of its extremity toward the floor of the bladder. A little pressure on the floor reveals its position to the eye. The sound is now guided with a sweeping motion out in the direction of the ureteral folds. If it catches in the ureter, the sound will at once be felt to have a determinate direction, and it slips on backward and outward toward the posterior pelvic wall. The ureter may now be palpated on the sound. If the catheter is in the ureter, after waiting a few minutes the urine begins to flow, drop by drop, clear and unmixed with the methyl solution, demonstrating that it is being collected at a point above the bladder.

FIG. 357.

Kelly's Ureteral Sounds.

FIG. 358.



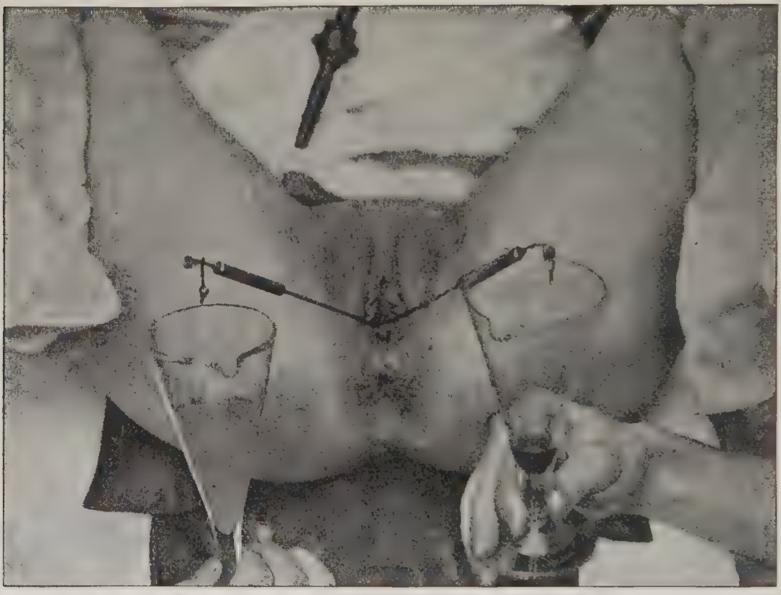
Kelly's Ureteral Catheters.

A ureteral stricture will be recognized with the bougie, sound, or catheter by its "bite." Below the stricture no discharge of urine will take place, but when passed above it a large quantity of urine flows through the catheter in a steady stream within a short time (say from 40–60 cc. in from two to three minutes), thus demonstrating the presence of a hydro-ureter.

The treatment of such a condition is dilatation by graduated bougies. Stricture, however, is rarely an uncomplicated affection.

Stone in the lower part of the ureter may be felt by the sound above a stricture, or even as low down as the vesical termination of the ureter. In the latter situation the stone may be recognized by an endoscope. A stone as low down as this may be extracted by a pair of forceps introduced through the urethra. A stone located higher up may be enucleated, after locating it by means of the sound and by touch, through an incision in the antero-lateral wall or in the vault of the vagina. The incision should be closed at once with silkworm-gut and fine silk sutures.

Fig. 359.



Catheterization of both Ureters. Left-hand glass showing greatest quantity of urine secreted during a given interval; urine clear. Right-hand glass showing much smaller quantity of urine secreted; urine bloody, indicating the diseased kidney and the character of the disease.

Cancer of the ureter almost invariably extends from the bladder, occluding its lumen and producing uremia.

Cancer of the uterus extending out into the broad ligaments commonly involves the ureters by pressure, producing hydro-ureter, hydronephrosis, nephritis, and finally death from uremic poisoning.

Ureteritis or an interstitial thickening of the fibrous coat of the ureter is sometimes found without apparent cause. The ureter feels like a distinct thickened cord, tender to pressure. Its lumen is encroached upon and the symptoms of stricture soon supervene. Attempts should be made to dilate the ureter with sounds. If one side is affected in its advanced stages, the kidney may call for removal. If both sides are affected, an opening may be made in each loin, draining the pelvis of the kidneys, and thus prolonging life.

AFTER-TREATMENT IN GYNECOLOGICAL OPERATIONS.

ABDOMINAL SECTION.

THE importance of this whole subject is realized by every surgeon engaged in the practice of gynecological operations, and the want of some convenient literature to which reference may be made has often been deplored.

There are certain well-defined principles which may be followed in conducting the after-treatment of a patient upon whom an abdominal section has been performed, but concerning the details of any given case, the surgeon must be governed in great measure by the conditions as they arise. These conditions may best be met and overcome by carrying out the principles to be enunciated, and by deviating from them only when an emergency arises; even then keeping well in view the general objects to be obtained.

Rest.—When the patient leaves the operating table rest is to be the first consideration—rest for the body, rest for the mind; the latter can only be attained simultaneously with the first. The woman should be placed upon her back, and kept in that position for the first few days or until her bowels have been moved. If a drainage-tube, especially a glass one, has been employed, she must remain in this position until it is removed. While upon her back the knees may be drawn up or the legs extended, as is most comfortable for her. She will frequently desire a change of their position, which should always be made by the nurse. While the knees are drawn up they are to be supported by a pillow inserted under them, so as to remove the strain incident upon the muscular effort necessary to keep them in position if left to themselves. It is never to be forgotten that when a patient lies for a considerable length of time in any one position every crease or wrinkle in the bed-linen becomes a source of annoyance, if not of great discomfort. The woman is intensely uncomfortable, and is suffering considerably from pain at the best, and every possible added source of discomfort must be removed. She is sure to suffer a great deal of pain and discomfort as the result of her operation, and if kept on her back she naturally attributes all the discomfort to the position, when in reality it is not so. It should be one of the chief objects of the nurse from the first to keep both the bed-gown and the sheets under the patient's back perfectly smooth. A woman will beg hard to be allowed to turn, if only for a moment, when, if her clothing and the bed-sheets are smoothed out and her pillows shaken up, she will be rendered fairly comfortable, and will remain so for a considerable length of time. This absolute rest upon the back is desirable for a number of reasons: If she is allowed a little liberty, she will toss and turn about, hoping to find relief first in one position, then in another, only to fail; but in the meanwhile a ligature which has been loosely placed or which encircles an especially large pedicle is unable to withstand the tension it is placed under, and bleeding begins—possibly only slight in amount, but it may be sufficient to kill. When a drainage-tube is used, if made of glass, it is very likely to become broken, and if of any other material, displaced. The stomach, which is already irritable, becomes worse, and the vomiting is not so quickly controlled. Every movement causes the patient pain, and if the edges of the abdominal wound are not closely coapted, they are apt to become displaced, as are also the dressings. The pulse is always more steady with the patient in the dorsal position.

Vomiting.—Rest must not only be obtained for the body but also for the stomach. The anesthetic has rendered that organ so irritable that the slightest disturbance causes it to reject anything it may contain. The retching and vomiting following abdominal section are exaggerated over and above that from simple anesthesia. The symptom is to be treated by rest, pure and simple. Under any circumstances the organ will remain irritable until the effect of the anesthetic has worn away, and drugs will not improve its condition materially: it will be extremely fortunate if they do not render it worse. The treatment of the vomiting consists in allowing the stomach to remain quiet. This is best accomplished by withholding drugs, stimulants, food, or water. Absolutely nothing should be allowed to pass the patient's lips until the vomiting has ceased, which will generally be within from twelve to twenty hours. Should it be necessary to administer nourishment during this time, rectal enemata may be used; however, the patient usually does very well without either nourishment or stimulants for several days.

Drink.—It is well to withhold fluids until the vomiting has entirely ceased, and then to administer them only in small quantities. They should be begun by allowing a small spoonful of hydrant- or soda-water every fifteen minutes, testing the ability of the stomach to retain and absorb it, and gradually increasing the quantity until within twelve hours the patient is taking an ounce each hour. The mouth may be moistened and cleansed during the interval of vomiting immediately succeeding the operation, by the aid of a wet cloth on the finger of the nurse. Should the thirst become intolerable during this period, it may be relieved by administering an enema of two or three ounces of hot water at intervals of four hours. The habit of giving ice by the mouth is bad and should be avoided. The cold water accumulates in the already over-irritated stomach, which is in no condition to absorb, until it finally is rejected, in the meanwhile having rendered the patient more uncomfortable. The intense thirst created by the withholding of drink is a great desideratum, as the blood-vessels, being unable to satisfy their demand for fluids from the stomach, draw upon the serum and blood which have accumulated in the pelvis. An amount of septic matter of which the peritoneum might readily dispose may cause a septic peritonitis and death if it can find so favorable a medium in which to develop as is afforded by this accumulated bloody serum.

Food.—For the same reason that it is unwise to give drink it is best to withhold food. The stomach will not retain it until it has recovered from the irritation of the ether: even should food be retained, it will accumulate and remain unabsorbed, the added irritation of its presence causing an excessive pouring-out of gastric juice and considerable discomfort to the patient. In addition, purgatives will not act so readily when administered together with food, and it is desirable to have the bowels move as soon after an operation as possible. If food lay on the stomach for any length of time, decomposition sets in and flatulence is induced. Food may be safely withheld for forty-eight hours excepting in unusual cases, when, if it be required, it may be given in the form of enemata; stimulants may be administered in the same manner when indicated. When the stomach has shown itself thoroughly tolerant to drink, it is then time to begin to offer the patient fluid nourishment.

Buttermilk is most acceptable to the majority of women. It should be given in small quantities often repeated, half an ounce every hour or two, testing the capability of the stomach to retain and digest it. It is not wise to attempt too much in the way of feeding until the purgatives have gotten well under way. Milk, unless predigested, is not a good food for this class of patients; it almost invariably causes the formation of flatus. Beef-tea or beef-extracts may be alternated with the buttermilk. Soups or broths of any kind may be substituted as the patient tires of one or the other. In fact, any article of soft diet which is suitable for the sick-room may be of service, the greater the variety the better. As soon as the bowels have been opened, usually in about forty-eight hours, the patient's appetite begins to assert itself, and where before she took what was offered her under protest, she will now begin to enjoy what she is given. It is at this time perfectly safe to consult her appetite; anything that she fancies may be given her. As a matter of fact, for the first four days after the operation she will want little but soft or semi-soft food, but if after the bowels are opened she wishes solid food, it can do no harm to allow her to have it. She has been starved for three or four days; now feed her generously. There are exceptions to this, but they will be noted in their proper places.

Purgatives.—It is imperative to obtain a movement of the bowels at as early a date after operation as possible. The condition of the bowels and pulse is the surest indication of the progress of the patient. If at the end of forty-eight or sixty hours a good and satisfactory movement of the bowels has been obtained, and the pulse be below 100 beats to the minute, the patient is convalescent. If, on the other hand, the bowels remain unmoved in spite of all efforts to open them, tympany begins to appear, and the pulse slowly rises to the neighborhood of 120 beats to the minute or higher, it is a serious matter for the patient. The one hope under these circumstances is to get the intestinal canal open, and it is at times astounding to note the great change for the better which takes place when this has been satisfactorily accomplished. The distress incident to the distension will have disappeared, the vomiting will have ceased, the pulse will have dropped to the neighborhood of normal, the anxious expression of the face will have cleared away, and the patient will look and express herself as feeling very much better in all respects. The alteration is that of complete change from an appearance and condition of extreme distress and suffering to one of absolute contentment and comfort. Twelve or fourteen hours after the operation, or as soon as the vomiting has ceased, calomel in grain doses, to be repeated each hour, should be given until eight or ten doses have been taken: this should be followed by a Seidlitz powder or a teaspoonful of Rochelle or Epsom salts every two hours until the desired effect is accomplished. As soon as flatus is passed or the saline is rejected, a large enema of hot soapsuds, a quart or more, containing a tablespoonful of turpentine, should be given: the enema may be repeated at intervals of two or three hours if necessary. Calomel will be retained upon the stomach when everything else is rejected, but there must be a limit to the administration of this drug, else the patient will become salivated. A stomach which is ejecting everything will become settled when the calomel is begun. If the magnesia salts are not retained, some other form of drug will have to be used, such as compound licorice powder, or, in desperate cases, even croton oil. When the bowels have not responded to treatment by the end of the third day after operation and the pulse has gradually risen to 130 beats or more, it is the exceptional case which recovers: such patients are generally dead by the end of the fourth day. Efforts to obtain the desired result should not cease until the case is clearly hopeless. If the bowels do respond, even apparently desperate cases at times rally quickly, and are convalescent in a few hours. The depletion of the blood-vessels incident to the purgation is another factor in causing the absorption of the bloody serum in the peritoneal cavity, and for this reason, if for no other, it is desirable to secure a number of watery stools. A daily movement should be secured subsequently.

Should any of the intestines become injured during the course of the operation, and there is danger of fecal extravasation, absolute rest must be obtained for the bowels until such time as Nature may protect the dangerous point with peritoneal lymph and adhesions. Under these circumstances morphia may be administered hypodermatically in quarter-grain doses repeated sufficiently often to keep the intestines quiet. Three or four doses in the twenty-four hours will answer the purpose: possibly opium suppositories of one grain each, repeated at intervals of six or eight hours, would answer just as well or better. The opiate, in addition to helping to inhibit the peristaltic action of the intestines and tending to prevent the natural secretions in the gut, allays the irritability of the stomach and prevents retching or vomiting until such time as the adhesions and lymph have become strong enough to offer the necessary resistance. Should vomiting occur during the first few days, almost certainly will the intestinal contents be forced through the light barrier formed by the lymph and into the pelvic and abdominal cavity. No effort should be made to move the bowels for at least four days after operation, when small doses of magnesium sulphate or castor oil may be administered, followed by an enema of soap and hot water as soon as the patient feels a tendency for the bowels to move. Great care should always be observed in such cases in giving the enema that the bowels be not over-distended, else irreparable damage may result. If the injury has been to the small intestine, it will have been repaired with stitches at the time of the operation, and little difference need be observed in the after-treatment except that purgatives should not be begun until the end of the second or third day. Not much harm can occur from an injury so high up. Where the damage is to the sigmoid flexure of the colon or to the rectum, as is most generally the case, it is so low down in the pelvis that the sutures cannot be satisfactorily or safely placed, and unless great care is observed, irretrievable damage may be done when the bowels are allowed to open. It is not a good plan to allow the intestine to remain quiescent for too long a time, else the colon and rectum will become filled with scybalous masses which may prevent closure of a laceration or may tear it open after it is partially healed. When the bowels have once moved they should be opened daily, if not acting naturally, by a laxative or an enema.

Bladder.—Should it become necessary, the urine may be withdrawn with the aid of a catheter. It is only, however, when absolutely necessary that the catheter should be used. If a proper length of time is allowed to lapse after the operation, most patients will void their own urine, and, having once done so, there will be no further necessity for the use of the instrument. If the bladder is once relieved artificially, it is most likely that it will be again demanded by the patient, and if the temptation be yielded to a few times, it will be difficult to break up the habit. It is best, if possible, to force the patient to pass her own urine from the start, and if she is watched carefully for any untoward symptoms, the urine may be allowed to accumulate for from fifteen to twenty hours if necessary, the patient being offered the bed-pan occasionally during this interval, and every effort being made to aid her in her endeavors to accomplish the act of urination. A small stream of warm water squeezed from a sponge, if allowed to run down over the meatus at times, accomplishes the result. When the catheter is used, the greatest care should be taken that the bladder is not infected. The instrument should be preferably a soft-rubber one, and should be antiseptically clean. It should have been prepared by being immersed in boiling water, washed in a bichloride-of-mercury or carbolic-acid solution, and kept until needed in alcohol. It should never be used without fully exposing the parts. The patient's knees being well drawn up and separated, the labia are drawn apart with the finger of one hand and the meatus exposed to view. The parts are thoroughly cleansed with a piece of cotton wet with a carbolic-acid or bichloride-of-mercury solution, and the point of the catheter introduced directly into the meatus without being allowed to come in contact with any of the parts. Thus, and only thus, can the patient's bladder be ensured against infection. A cystitis at this stage of the convalescence will often give rise to serious symptoms and an immense deal of discomfort, to say nothing of danger to the patient.

If during the operation the bladder has been injured or torn open, whether it has been sutured or not, the after-management of the urine must differ somewhat from that which is usual. If under these circumstances the organ is allowed to become distended, there is apt to be leakage at the point of injury between the sutures, or if only the outer coats of its walls have been torn away in separating adhesions, a rupture might readily occur at this point were the urine not removed for fifteen or twenty hours. It should always be arranged in case of such injuries that there be no accumulation allowed. A soft-rubber catheter may be left in the bladder permanently, by means of which the contents can be conveyed into a vessel over the side of the bed, through a long piece of drainage tubing attached to the end of the catheter; or, better still, a self-retaining female catheter may be utilized for this purpose. Three or four days will be sufficient for its use, after which the patient may be catheterized five or six times in the twenty-four hours, the use of the instrument becoming gradually less frequent, until in a week or ten days it may be omitted altogether. If during the convalescence cystitis should develop, it becomes necessary to treat it promptly. A careful inspection of the methods of catheterization should be made, and rectified if found faulty. The vast majority of cases arise from this source. Diuretics should be administered freely, provided the stomach has reached the state when it can bear them.

If the cystitis develops within the first day or two, before the bowels are thoroughly opened, all internal medication is better withheld for the time and local treatment depended upon. In any event, most reliance must be placed upon the local management, irrigating the bladder twice daily with a mild antiseptic solution, and seeing that no residual urine remains to undergo decomposition. A warm solution of permanganate of potash, not sufficiently strong to cause burning, may be passed into the bladder until the patient complain of the distress. This is accomplished by the aid of a soft-rubber catheter with a piece of long rubber tubing attached, terminating at the opposite end in a small funnel. The funnel is elevated, and the fluid allowed to enter the bladder through the introduced catheter, by the force of gravity. As soon as the woman complains of much pain, the funnel may be depressed into a vessel resting on the floor, and the solution allowed to siphon away. The action of the residual urine will have decomposed the permanganate of potash in the solution, and it will return almost the color of ordinary water. It is then necessary to refill the bladder with a fresh solution, in order that the unaltered drug may come in contact with the inflamed and suppurating walls. After a few washings the patient will become more comfortable and the cure will be accomplished quickly. The urine in the mean while must be rendered as nearly neutral as possible.

If there is preëxisting kidney disease, symptoms of uremia may develop after the operation. The quantity of urine voided should be carefully noted and this symptom anticipated: following the operation, the quantity of urine secreted during the first few days is always small, and due allowance must be made for this. The treatment of this complication will be similar to that of uremia under any other circumstances. If it once develops, the patient is usually lost, although an occasional case is saved by prompt action. Purgation, diuretics, heat, and local bleeding are all indicated, and must be applied promptly if any good is to be derived from them. Croton oil for purgation, cocaine for diuresis, leeches and cupping over the kidneys for bleeding, and dry heat applied about the parts, are the chief remedies to meet the indications.

Bathing.—Bathing is an important element in the comfort of an operative case, and should be begun as soon after operation as possible. The bowels will, in a normal case, be opened by the end of forty-eight or sixty hours. As soon after this as the patient has had time to rest a while and regain a slight amount of strength, there being always a period of a few hours of weakness after the purgation, a warm sponge-bath may be safely given. The end of the third twenty-four hours is about the usual time for this first general bath : from the very first the hands, arms, neck, face, and legs should have been frequently bathed. From this time a daily sponge-bath of warm water, followed by alcohol, is to be given. The amount of comfort derived from this procedure is indescribable, and, if due care be taken not to chill the patient, not the slightest harm can come of it. The hair and teeth should receive attention from the very first.

Flatulence.—This symptom is the most distressing one met with in the after-treatment of abdominal surgery. It accompanies, more or less, all cases, although in a very great many the amount is so slight that it is hardly noticed and requires no special attention. Where the woman's life is seriously threatened and she is eventually going to die, it is usually at its worst, and practically nothing can be done for its relief.

Flatulence itself is capable of killing, and almost to the last it is impossible to say whether or not there is a chance of saving the patient: for this reason there should be no cessation in the efforts for its dissipation. Usually it does not appear for from twelve to twenty-four hours, and in the majority of cases, where the bowels are opened at the end of forty-eight hours, it is permanently relieved. This being true, the great effort for its relief should be in the direction of securing a movement of the bowels. That form of flatulence which appears within twelve hours after the operation is usually easily dealt with, and in itself has no great significance and need give no particular alarm. It is the variety which begins to show itself toward the end of the second twenty-four hours, which is accompanied with a refusal of the bowels to move, together with a quickening and weak pulse, which is to be dreaded : it most frequently means septic peritonitis and death. Little in the way of drugs, excepting purgatives, is worth administering. Large rectal enemata of water and turpentine, and the rectal tube introduced and at times allowed to remain *in situ*, will in some cases give relief. This is not very great, however, and the practice has more theoretical than practical value. Puncturing the intestines through the abdominal wall is never justifiable: if it is thought desirable to attempt to relieve the distension by this source, a small incision should be made in the abdominal wall, a knuckle of gut caught up, opened, and either stitched to the abdominal wall or else closed by a few sutures when the opening has accomplished its object. The same thing might readily be done through the original incision by removing a stitch or two and separating the edges of the wound quickly with a finger. The whole procedure can be carried out with the patient lying in bed and without an anesthetic. It is rare that anything can be hoped for from this direction, however, and it is seldom worth considering. Usually the result would be that only a single coil of intestine would be emptied, and nothing particular would be accomplished. The stomach-pump is a valuable aid in some of these cases, especially where the distension appears quite prominent in the epigastric region. Large quantities of fluids and air may be occasionally removed by its aid, and the distressed expression on a patient's face will clear up almost instantly after its successful use. After the first application the patient will in a few hours beg for a repetition, so great has been the relief obtained.

As a matter of fact, unless the bowels can be gotten to move we can do little to permanently relieve this symptom, and even in those cases of sepsis in which the bowels have responded to the purgatives and enemata in a more or less satisfactory manner, the relief from the flatulence is not great, nor is it permanent, returning in a few hours, with the bowels obstinately constipated. At times, when nothing else will answer the purpose, turning the patient on the side will bring about the desired result.

The causes of flatulence are varied. Too early administration of food where the stomach is so irritable that it does not perform its function of digestion and absorption, is a common cause. Milk, especially, of all foods, is most likely to favor its formation.

It invariably accompanies sepsis, in which case it is most stubborn. Handling the intestines during the operation is supposed to be a common cause, but at times it is likely to follow in cases where the intestines have not been seen or have been handled the minimum amount, and at other times, when there have been partial evisceration and severe handling, even to the placing of stitches in the intestinal walls, there is no flatulence following the procedure. The real cause of flatulence is unknown, and its treatment is most unsatisfactory, except where the bowels can be gotten to move, when, as a rule, it disappears.

Drainage-tube.—The care of the drainage-tube is one of the most important parts of the after-treatment. Should the tube be made of glass, each time it is cleaned the nurse or physician is practically dealing with an open wound, and just as great care should be manifested in its cleansing as is done at the operation itself: for the first few days the danger of infection is just as great. Should the tube-track become infected at this time, the chances are largely in favor of a septic peritonitis and death; if the infection takes place later, when Nature has thrown out enough lymph to protect the peritoneal cavity, a suppurating pelvis may be the worst result. Under any circumstances infection is dangerous: if it does not end in death, it generally terminates in a fistula, which is more or less stubborn in healing. In cleaning a glass drainage-tube it is necessary to pass a long-nozzled syringe to the bottom of the tube in order to suck up the serum and blood which have accumulated in the pelvis. The syringe itself may be infected and carry the poison into the pelvis, or it may become infected as it passes the mouth of the tube. At each tube-cleaning the hands should be well washed with soap and water and disinfected with a bichloride-of-mercury solution. Clean towels should be placed about the tube, and the dressings over its mouth removed, so as to expose the opening. The syringe should be immersed in boiling water and the barrel filled and refilled several times; it is then to be filled and refilled several times with a bichloride-of-mercury solution (1:1000); from this solution it is to be passed again into hot water and the mercurial washed away, when it is ready for use. The point of the syringe is passed to the bottom of the tube, and then withdrawn about a quarter or half an inch, so that when the piston is drawn the fluids in the pelvis will be sucked up, but not the tissue of the pelvis. If any clots or shreds of tissue remain in the pelvis, the suction will draw them to the mouth of the nozzle, when by keeping up the suction they may readily be withdrawn. The syringe is to be used until the tube is perfectly dry. After using the syringe, it is to be first washed out thoroughly with hot water until the flow comes away perfectly clear and unstained, then the bichloride-of-mercury solution is to be repeatedly drawn into it, and the syringe put away wet with the solution. It is to be placed immediately upon a clean towel kept for that purpose, and folded up so as to remain unexposed until again required. Each time the tube is cleaned its mouth is to be well washed with a piece of cotton wet with a bichloride-of-mercury solution, and the wet cotton is to be passed down the tube as far as possible (an inch), so as to render its caliber thoroughly clean. The rubber-dam about the tube should be carefully cleansed of any drops of blood or serum which may have soiled it, and clean cotton is placed over the mouth of the tube. All this trouble may seem unnecessary, but any one familiar with the dangers of sepsis will appreciate its importance. A drop of blood or serum left about the mouth of the tube or in the syringe will quickly undergo decomposition. It is much easier to prevent sepsis than to cure it.

Each time the tube is cleansed it should be twisted back and forth several times. The lymph which is thrown about the tube, penetrates the small perforations at its bottom, and if not broken up, and kept so by frequent rotation, becomes firm enough to cause considerable difficulty in the subsequent removal. This difficulty has been such a common one that several instruments have been devised for the express purpose of cutting the tube loose. If the simple precaution be observed of twisting the tube back and forth at each dressing, no such difficulty will ever arise.

The drainage-tube should be allowed to remain *in situ* until such time as it is no longer needed for drainage. This time varies in different cases, and no hard-and-fast rule can be laid down for all. A few drachms of clear serum may always be found in the peritoneal cavity, and when the amount which can be drawn from the tube reaches two or three drachms at five or six hours' interval, and this fluid is clear or nearly approaches straw color, the time for the withdrawal of the tube has come. A drainage-tube should be cleansed as often as it becomes necessary, no attention being paid to the shortness or length of time. Immediately following the operation it should be emptied every fifteen minutes or half hour. It should never be allowed to go sufficiently long to overflow and soil the dressings. As the quantity of fluid decreases, the interval of cleansing is lengthened, until by the end of twenty-four hours it is generally not necessary to clean it oftener than once in three hours.

Sometimes in twenty-four hours the tube may be withdrawn, or it may be necessary to allow it to remain for a week: about three days is the average length of time. In withdrawing the tube it is only necessary, after removing all the dressings, to make traction upon it, meanwhile rotating it as it is drawn out. The same careful antisepsis is to be observed in removing as in cleansing it. A small piece of antiseptic gauze is placed over the opening left by the withdrawal of the tube, and its edges are drawn together with a strip of adhesive plaster. The dressings are replaced, and not disturbed again until the stitches are removed.

In some cases the surgeon fears that the pelvis or certain parts of it may suppurate or that a fecal fistula may form, and yet the drainage-tube is ready, from all appearances, to be withdrawn a day after the operation. Under these circumstances it is best to allow it to remain for three or four days, cleansing it only often enough to have an idea of what is going on at its lower extremity—possibly twice in the twenty-four hours unless the symptoms indicate otherwise.

Should suppuration occur, the tube is to be kept in place until the amount of pus discharged begins to diminish, when it may be withdrawn and the opening allowed to gradually contract. During the acute stage of suppuration the tube should be cleansed every few hours and washed out with boracic-acid solution: later, after it has been dispensed with, peroxide of hydrogen is the most efficient wash for cleansing and disinfecting the tube-track. The opening generally closes in a week or two, or if not, the condition becomes chronic and a permanent fistula results.

Should the drain be of gauze instead of glass, the care of it will be somewhat different. The gauze drains by capillary action, and keeps the dressings continually wet, so that it is necessary to change them frequently. The whole arrangement of the abdominal dressing is such that the parts about the drain may be changed without removing all. The one commonly used is that known as the Mikulicz drain. It consists of a gauze bag containing a number of pieces of gauze, the end of each piece protruding from its mouth. In withdrawing the drain the pieces are picked up with a pair of dressing forceps and withdrawn separately; as they are removed the bag collapses, and is easier withdrawn than if the whole drain was removed together. In drawing out the bag care should be taken that no pieces of intestine or omentum follow, as at times is apt to be the case: should this occur the viscus is to be replaced at once with the forceps and the edge of the wound drawn together with the ligature which was placed for that purpose at the time of operation, or by a strip of adhesive plaster, care being taken that intestine or omentum be not included between the lips of the wound.

Dressings.—An ordinary case of abdominal section need not have the original dressing removed until the time has arrived to take out the stitches. Should a drainage-tube be in use, the dressing may become soiled, when it will be necessary to change it, or if the incision or the stitch-tracks suppurate, it will be advisable to remove the dressing, not only to replace it by a clean one, but in order to apply remedies to the suppurating parts. A full week should elapse before disturbing the stitches. Stitch-hole abscesses may arise before the stitches are removed or afterward. The stitches should be taken out on the eighth day unless suppuration has previously occurred, when it may become necessary to remove them immediately. This procedure is accomplished by picking up one of the strands of the stitch by the aid of a pair of hemostatic forceps, lifting the knot out of its bed, and exposing both strands of the stitch below the knot. The blades of a pair of scissors are opened, and made to include one of the strands as it dips down into the tissue; the scissors are pressed down into the skin at the same time that the knot is elevated by the forceps. This procedure exposes a portion of the ligature, which has been buried in the tissue, and which is white and clean and has not been infected. The ligature is cut in this uninfected area. As the cut end is drawn through the tissues in its removal, there is no danger of dragging infection with it, when if the stitch had been cut above the skin-surface a portion of contaminated suture would infect, in many cases, the suture-track. In this manner are caused stitch-hole abscesses which form after the stitches have been removed. After the one strand of the stitch is cut, the knot is to be drawn in the direction *across* the incision, not away from it. Should it be drawn away from the incision, there is an excellent chance that the skin-union will be separated at points, and possibly throughout its whole extent.

After the stitches have been removed the parts about the incision should be cleansed with a piece of cotton dipped in a solution of bichloride of mercury, care being taken not to disturb the line of union. The dried clots may be left alone, else in their removal some raw surface may be exposed. A small piece of antiseptic gauze is to be placed over the incision, and the parts held together by several strips of adhesive plaster, a binder being placed over the whole. Usually no more attention need be paid to the wound.

If the incision suppurates, it is best to remove the stitches at once, allow the superficial parts of the wound to separate, and treat the incision as an open wound by disinfecting and packing. The cicatricial tissue resulting from this method of healing will be the surer barrier to a future hernia. If stitch-hole abscesses exist, it is only necessary to provide for their drainage. Usually as the stitch is withdrawn the pus will flow from the opening left by its removal, and it may be necessary to empty the abscess once or twice a day by gently squeezing it, care being taken not to exert too much pressure: the abscess will, as a rule, heal within from two days to a week. A considerable rise of temperature and pulse may accompany these abscesses, but the symptoms disappear almost at once after drainage has been provided. While suppuration goes on the dressing should be changed twice daily and the parts thoroughly cleansed. It should be treated, in fact, like any suppurating wound. If any of the cavities are very large, it may be well to inject them with peroxide of hydrogen or bichloride-of-mercury or other antiseptic solution.

Hemorrhage.—For hemorrhage following an abdominal section there is but one treatment. As soon as the surgeon is reasonably certain that serious bleeding is going on, the wound must be opened and the bleeding vessel ligated. Attempts to apply any other treatment are useless, and the less time lost the more chance there will be of saving the patient. Care should be taken in re-opening the wound that everything is just as antiseptic as at the original operation.

If a drainage-tube has been used, it will usually indicate that bleeding is taking place, but this is not to be depended upon for an indication as to how much blood is being lost. The abdomen has been opened and found filled with clots when the tube projecting into its cavity had been cleaned every ten or fifteen minutes, and it was supposed that all the blood had been withdrawn. Even if the tube does not indicate that a dangerous amount of blood is being lost, if the constitutional symptoms look strongly suspicious, the abdomen had better be re-opened and the bleeding vessel tied. The constitutional symptoms will be the same as those of concealed hemorrhage from any other cause. If the bleeding comes from torn adhesions, and is simply a free ooze, no alarm need be felt concerning it. It matters not how free it may be at first, it will last but a short while. The indications are to keep the drainage-tube perfectly dry, so as to favor coagulation of the blood and consequent cessation of the bleeding. The oftener the tube is cleansed and the drier the pelvis is kept, the sooner will the hemorrhage cease.

If the patient, having rallied from her ether, with a good pulse and practically normal temperature, be found in the course of the next twenty-four hours to be showing indications of collapse, together with a rising pulse and a falling temperature, hemorrhage will almost always be found to be at the bottom of the trouble. The pulse under these circumstances becomes feeble, and is rapid and running in character. The temperature and pulse, together with the general condition of lassitude and growing indifference, are almost pathognomonic of the condition. If the bleeding be allowed to continue, these symptoms gradually deepen, and the more advanced indications of collapse, such as great pallor, sighing, and cold surface, supervene.

Shock.—The symptoms of shock may readily be mistaken for hemorrhage, the difference being that in hemorrhage the indications do not begin for some hours after operation, while in shock they are present from the first. Otherwise, the two present so many points of likeness that it is at times difficult to say which is present. The indications for treatment in shock following abdominal section are exactly the same as for that condition from any other cause—dry heat applied to the whole surface of the body, care being taken not to burn the skin with the hot cans or bottles; whiskey and ammonia. Strychnia is the most valuable of all drugs for this condition, and may be given freely without fear. It should be given hypodermically in doses of one-twentieth of a grain repeated every half hour for two or three hours, and then each hour until the patient is decidedly better or shows signs of muscular twitching. It is far better to take the chances of producing strychnia-poisoning than to give too small a quantity. If the patient can be carried over the shock, it will be time enough afterward to attend to the poisonous symptoms.

Sepsis.—The management of this complication will depend much upon the character and extent of the infection. A general pelvic and abdominal septic peritonitis following abdominal section is never cured: the patient invariably dies. For more than two days it is doubtful just what is the trouble with the patient; in fact, one cannot be certain that there is anything seriously wrong. By the time it is reasonably certain that there is septicemia to deal with, the patient is beyond relief, and is dead before the end of the fourth twenty-four hours after the operation. Usually the condition of the patient immediately following the operation is fairly good, but within the first twenty-four hours the pulse gradually and almost imperceptibly creeps up until it reaches 110 to 120 beats to the minute. It is weak and inclined to be running. The temperature simultaneously ranges in the neighborhood of 100 or more degrees. The ether-vomiting is prolonged beyond the usual limit of twenty-four hours, when most probably the stomach will have an interval of rest for six or eight hours before the secondary vomiting due to the septicemia sets in.

During this interval of rest from vomiting the pulse gradually but steadily creeps higher and higher, becomes more rapid and weak, and finally thready. The temperature at the same time becomes more and more elevated. The abdomen becomes distended, due partly to flatulence and partly to the retention of the purgatives and nourishment. In spite of all efforts to move the bowels, no indication of borborygmus or of passage of flatus can be obtained. The stomach finally begins to expel everything placed in it. The rectal enemas are promptly rejected. Profuse sweating and cold creeps set in. The dull, heavy muscular pains of septic poisoning supervene. The patient becomes restless, tossing from one side of the bed to the other. The facial expression, which has been gradually becoming more and more anxious, deepens, and the patient assumes an altogether hopeless appearance. Prior to death the pulse becomes so rapid and weak as to be imperceptible: the temperature may rise even to 106° or 107°, and the body is bathed in a cold, clammy perspiration. The vomited matter is dark brown.

No effort should be spared to secure a passage of the bowels until the trouble has plainly manifested itself.

Whiskey and strychnia should be given to the point of tolerance, many of these patients taking from a pint to a quart of whiskey in the twenty-four hours without showing signs of its constitutional effect. Quinine in large doses is a valuable adjunct to the management of these cases. The hypodermic needle and rectal enemas must for the most part be depended upon for the administration.

If at the end of sixty hours there is no longer doubt as to the complication, it is useless to make further effort, other than to render the patient's death as easy as possible. Under these circumstances opium is the one drug to depend upon. It will relieve the pain and suffering, and that is all it is in the power of the physician to do for his patient. Theoretically, the proper treatment would be to open the abdomen, irrigate it thoroughly and introduce a drainage-tube. It would probably be best to do this as early as twenty-four or thirty-six hours after operation should by any chance the diagnosis be made, but even at this early period it is more than doubtful whether any good would be accomplished. When the abdomen is opened the condition found will be that of a general matting together of the pelvic organs and those loops of intestines and omentum hanging into the pelvis. An ounce or two of dark fluid will be observed on breaking up the adhesions. The only effect obtained will be to expose more surface to absorption by separation of the adhesions. If any good can be accomplished in this direction, it will be by providing free and continuous irrigation of the whole pelvic cavity for several days or until such time as the patient is convalescent. If the infection be introduced at the time of the operation, and be given twenty-four or thirty-six hours in which to develop, the case is practically hopeless. The diagnosis cannot possibly be arrived at earlier than at the end of forty-eight hours with any degree of certainty.

Should a local suppuration occur about the pedicle or elsewhere in the pelvis and an abscess result, the condition is amenable to treatment and the patient will easily recover. The symptoms induced by the abscess will be the ordinary ones of septic infection, which, taken in conjunction with the knowledge obtained from the operation, will readily indicate their true cause. For the first few days the patient progresses favorably. Movements of the bowels are obtained in response to the purgatives and enemas, but not of a satisfactory character. The pulse remains high, from 100 to 120 beats to the minute, but fairly good in character. The temperature ranges from 100° to 102°, or higher, with a daily evening elevation. The patient may at times reject her food, having little or no appetite. Her mental condition is clouded, and she complains of dull pains and cold creeps. Her general condition is heavy and lethargic. Night-sweats are present. The abdomen is more or less distended, and colicky pains are apt to disturb her in consequence. These symptoms are of more gradual development than those of general septic infection of the pelvic cavity. At no time do they become so intense, and seldom threaten speedy death.

The only proper treatment is to empty the abscess and drain the cavity after having washed it out. It may be necessary to re-open the abdomen to accomplish this. Frequently in these cases a drainage-tube has been used in the pelvis, and it is then most probably near the seat of the abscess. Under these circumstances, if the symptoms will allow of delay, it is best to wait for a few days, or even a week if necessary, in hopes that the abscess will rupture into the drainage-tube, which it generally will do. Should the temperature, pulse, and other symptoms become alarming at any time, the lower end of the incision had best be opened, and the abscess sought in the pelvis amid the adherent intestines and opened with the finger, care being taken not to invade, if possible, the general peritoneal cavity. If the pus be thoroughly washed away, the temperature and pulse will fall almost immediately to normal, and the other symptoms will disappear coincidently. Stimulation by whiskey, strychnia, and quinine is to be begun early and carried out freely, only stopping short of the physiological action of the drugs. Septic symptoms due to stitch-hole abscesses are to be treated as already described under the head of Dressings.

FISTULÆ.—These are either simple suppurating, fecal, or urinary. The simple suppurating fistula is the most common. It is generally due to an infected tube-track or to septic ligatures. The majority of fistulæ close eventually without special treatment for, which reason they should be treated expectantly rather than by a secondary operation. If they are caused by an infected ligature, they will not heal until the ligature has come away, when they usually close very promptly. Various methods have been proposed for removing the ligature through the fistulous track without re-opening the abdomen. A pair of small-bladed forceps may be passed into the opening and an attempt made to catch the offending body: the introduction of pieces of twisted wire and various other devices have been adopted, with success in but exceptional cases. The silk will eventually work itself free and appear at the mouth of the fistula. Few fistulæ remain open unless there is a foreign body present as the cause: the exception occurs in women who are probably suffering from tubercular or other general conditions.

Under any circumstances the sinus should be kept clean and free from the discharges; at the same time the general health should be looked after, and if there is any condition such as tuberculosis present, it should be treated accordingly. Peroxide of hydrogen diluted with water—half and half—or in its pure state is probably the best wash which can be used. It is to be passed, by the aid of a syringe, to the bottom of the fistula and allowed to regurgitate, the injection being kept up until it comes away clear and clean without any appearance of froth: it would be well to wash the sinus out several times daily, the dressings being changed frequently enough to keep the parts clean.

It is proper to wait from three to six months, or even longer, before attempting any radical procedure. The operation necessitates opening the abdominal cavity, with all the chances of infecting the peritoneum with the discharges of the sinus. Should the operation be undertaken, the parts must first be thoroughly disinfected, and the sinus washed out with peroxide of hydrogen and a solution of bichloride of mercury. The abdomen is opened, the adhesions broken up to the bottom of the fistula, and the ligatures removed: the walls of the fistula should be separated with the scissors and curetted away as far as possible. Should no ligature be found, the walls of the sinus must be thoroughly destroyed. In closing the abdomen a drainage-tube must be introduced for a few days in order to guard against possible suppuration.

Nothing can be done for chronic fecal fistulæ short of an operation, except to keep the parts clean. It is not always advisable to attempt an operation in these cases, for the reason that the opening in the bowel is often so low down in the rectum that it is impossible to bring the parts within reach so that sutures can be properly placed: in addition, the tissues of the gut are often so badly disorganized that stitches will not hold, and a resection would be necessary, when from the low position of the opening this would be impossible. If the operation is undertaken, the parts must be thoroughly cleansed and disinfected; the bowels should be purged and the rectum washed out by an enema. After invading the abdominal cavity the adhesions between the coils of intestines are to be carefully separated down to the opening in the bowel.

Occasionally in old chronic cases the fistula can be dissected out as a complete tube down to the intestinal opening, in which case there would be a minimum danger of infecting the peritoneal cavity. Under any circumstances the edges of the fistula are to be freshened and turned into the gut, sutures being placed so as to retain the edges in apposition. If the opening is sufficiently high to allow of a resection of the bowel, this may become necessary, provided it cannot be closed. Should it not be possible to close the hole or to resect, a drainage-tube must be placed so as to drain the immediate vicinity of the injured bowel, and the tube cleansed every fifteen minutes, to allow no spread of infection until sufficient lymph has been thrown about the seat of danger to protect the peritoneal cavity: in the mean time enough opium is given to keep the bowels quiet.

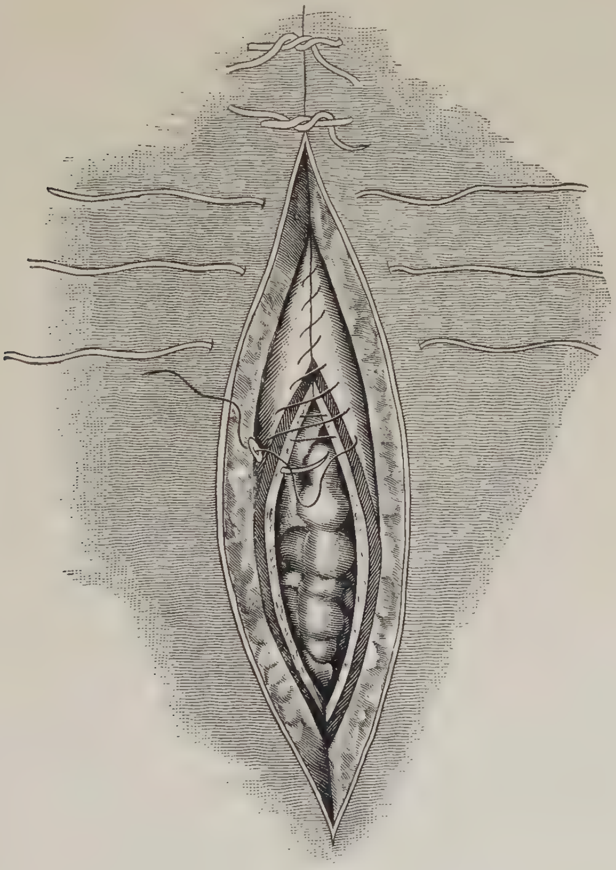
The operation for chronic fecal fistula is a tedious and dangerous one, and often results in failure or in disaster. It is the only hope of relief, however, and it is justifiable to take considerable risk with the hope of gaining a cure.

The primary treatment of fecal fistula is one of rest. Should the fistula occur three or four days after operation, enough lymph will have been thrown out to protect the general peritoneal cavity, and there will be little danger. Should it be discovered during the first few hours, while cleaning the drainage-tube, the tube must be cleansed at intervals of not longer than fifteen minutes, and the bowels kept quiet by the use of opium for three or four days at least. When the bowels have once opened, they should not be allowed to again become constipated, but daily evacuation should be secured by the use of laxatives.

In the course of a week the tube may be safely withdrawn, and the fecal matter allowed to flow through the track formed by the lymph. As long as the tube is in place the opening will not close, but as soon as it is removed the parts begin to contract, and gradually the flow of fecal matter becomes less and less, until finally in a few weeks it has ceased altogether. Most fecal fistulæ will close spontaneously if treated properly from the first.

Hernia.—This is one of the common sequelæ of abdominal section, and is due to a failure of union between the cut edges of the muscles and fasciæ. The hernia usually does not appear for some weeks after the woman is out of bed, and then only as a small protrusion at one point, from which it gradually spreads, until, if neglected, it at times occupies the whole of the original incision. As a prophylactic measure against this accident the longer the patient is kept in bed after her operation the better: too early getting up puts a strain on the newly-united incision and predisposes to hernia. When the hernia has once appeared, but two courses are open—either to use support at the opening and if possible prevent it from becoming larger, or to perform a secondary operation for its cure. A properly-fitting truss will keep the intestines back and to a great extent render the woman comfortable, but there is no chance whatever of the opening ever closing if left to itself.

Fig. 360.



Sutures in place for the Repair of Ventral Hernia.

In making the incision, great care must be observed in opening the abdominal cavity at the seat of the hernia, for the reason that the intestines are very apt to be adherent to the sac. The anatomical relations are all destroyed, and there is no certain guide as to where the knife is about to enter the peritoneal cavity. After the abdominal cavity is opened the old incision should be split to the full extent of the hernia both above and below. The peritoneal and adventitious tissue covering the edges of the muscle and fascia completely around the opening must be trimmed away with the scissors and knife, and the redundant portions of the sac resected. The edges of the several tissues are brought into apposition and the wound closed in the usual way after an abdominal section.

Various methods of repairing hernias have from time to time been used with varying degrees of success, but all the indications are met by the above method, especially if an extra and separate row of sutures be placed in the muscles and fascia in order to secure and retain their coaptation. Either catgut or silk may be used for this purpose. If the silk is surely aseptic, it is preferable, as it gives a permanent support to the tissues, while the catgut is apt to become so weakened by absorption within a few days as to be of no value. Subsequently the patient should be kept upon her back for not less than four weeks, to allow of thorough healing. Should the buried silk sutures suppurate, it is due to faulty technique, and the silk must be removed before the resulting fistula will heal.

The usual length of time for a patient to remain in bed following an abdominal section is at least three weeks. During the early part of the fourth week the patient may be allowed to sit up in bed, and by the end of the week she may begin to go about her usual duties. It is well, however, that she make a semi-invalid of herself for some weeks or more where this is possible, and secure the additional rest from work and worry. For six months or a year after the operation an abdominal binder should be worn, at the end of which time it may gradually be dispensed with. The neglect of these precautions often results in a very considerable amount of future discomfort to the patient.

Every woman who has had both uterine appendages removed suffers from symptoms of the menopause. Generally these are more stormy than those accompanying the natural menopause, but are proportionately shorter. Until this change is fully established the patient will not receive the full benefit of the operation. The condition requires treatment, and the indications are to be met as they arise in the way such symptoms are usually met in the natural menopause. The phenomena are essentially nervous, and the indications are for general tonics and nerve-sedatives.

As has been already noted, the infection which gives rise to the disease requiring an abdominal section in pelvic inflammation, proceeds from the vagina or the uterus into the Fallopian tubes. The removal of the uterine appendages does not always cure the case, but is merely the necessary preliminary step. Some cases are completely cured by the changes which go on in the uterus incident to the menopause, but in others, in spite of this, the womb remains enlarged, heavy, and engorged, and the leucorrheal discharges and hemorrhages remain just as profuse as before the operation. These cases require local treatment of the diseased uterus; otherwise a satisfactory result is not usually obtained except after a long interval. The womb should be thoroughly curetted, and the case treated as is proper in a case of endometritis and subinvolution. At times, however, the prolonged effect of the menopause is too much for even these cases, and they eventually, after several years, are relieved of their symptoms without any local treatment; other cases require that eventually the womb be removed.

Plastic Operations.

The after-treatment of plastic operations for the repair of the perineum and cervix resolves itself into rest and cleanliness. The shortest time the patient should be kept in bed is two weeks, after which she may take another week in getting up and about. As in abdominal section, the longer she remains in bed the better for her, and where a patient can be made content, a month is not too long a time, especially for prolapse cases. If a gauze tampon has been introduced into the vagina, it should be removed within forty-eight hours, and need not be renewed. A warm vaginal douche of boracic acid should be administered daily, care being taken not to make any pressure on the points of suture. The douche should be used for the purpose of cleanliness, after which a single strip of gauze an inch or two in width may be passed if desired into the cul-de-sac with the aid of dressing forceps. This accomplishes the desired drainage with the minimum interference with the seat of operation. Especial care must be taken in this regard when catgut sutures have been introduced.

In cases of uterine curettement, if the cavity of the womb has been packed with gauze, the packing should be removed at the end of forty-eight hours and the vagina thoroughly cleansed by an antiseptic douche. Afterward an antiseptic vaginal douche should be administered daily. If instead of the gauze a drainage-tube has been introduced into the uterus at the time of operation, it should be removed daily, cleansed, and replaced. This can readily be accomplished by placing the patient in the left lateral position in her bed and introducing a perineal retractor. The cervix being exposed and steadied by drawing it down with a tenaculum, the drainage-tube is caught in a pair of dressing forceps, withdrawn from the uterus, cleansed, and at once replaced. It will be perfectly easy before replacing the tube to wash out the uterus with an antiseptic solution by the aid of a Davidson's syringe with a rectal nozzle attached.

When a cancerous cervix has been removed by the aid of the curette and scissors, the tampon, which has been placed in great part to control the subsequent bleeding, should be allowed to remain for forty-eight hours, at the end of which time it may be removed. This is done with the patient lying in the left lateral position in her bed; the vagina and wound are then cleansed and disinfected, and a fresh tampon replaced, provided there be any signs of bleeding. If there be no bleeding, a single strip of gauze to provide for drainage is all that will be required. This should be renewed daily after each antiseptic douche.

The bladder is to be catheterized only in case of necessity, and unless there has been an operation on the anterior wall of the vagina the instrument will rarely be needed. In cases of repair of vesico-vaginal fistulæ, the bladder must be kept empty, either by frequent use of the catheter or by a self-retaining catheter. for four or five days, or until such time as it is safe to allow the urine to accumulate and the bladder to empty itself. The bowels may in all cases be opened the day following the operation; a daily passage should be secured thereafter; this holds equally good for tears of the perineum involving the sphincter. A dose or two of magnesium sulphate should be administered, and as soon as there is any manifest desire for defecation an enema should be at once given, so as to secure as easy and as soft a passage as possible. If bleeding occurs after an operation, it is best that it should be given an opportunity to stop of its own accord. This usually occurs, but should it persist, hot vaginal douches may be given, and if these do not control it resort to a vaginal tampon may be necessary, even though it spoil the operation. The tampon should only be used as a last resort: it will rarely be needed.

Except in cases of lacerated perineum where the sphincter is involved, or in cases of recto-vaginal fistulæ, the patient may be allowed anything to eat or drink she may desire. It is just as well in these two injuries to confine the diet to such articles as will leave little residue, so that there shall be as small an amount of fecal matter as possible. It will not be necessary to restrict the diet for more than four or five days. The stitches in plastic operations should be removed on the seventh or eighth day, after which time nothing in the way of treatment is necessary, except to see that the vaginal douche be given daily and that the bodily functions act properly. If a combined operation for the repair of the cervix and perineum has been performed, great care will have to be exercised in removing the stitches from the cervix, lest the union of the perineal wound be disturbed. For this reason the stitches in the cervix at the time of operation should be allowed to remain long and should be shotted. If this precaution be observed in placing the sutures, it will be easy subsequently to remove them by making traction upon the long sutures, and thus bringing the cervix into view, requiring a minimum amount of stretching of the perineum with the perineal retractor. The patient should be placed on a table in the dorsal position for their removal. If the same precaution be observed in regard to the placing of the stitches in the perineum, no difficulty will be met with in their removal. So great is the facility with which this can be done that even the nurse can be trusted with the removal of the perineal stitches. Should there be much discharge from the parts, a bichloride-of-mercury or a permanganate-of-potash douche may be substituted for the boracic-acid one, and it may be given two or three times daily. This is especially necessary in the after-treatment of vaginal hysterectomies.

The after-treatment of this operation, if performed throughout with catgut, is practically similar to that of plastic operations, greater care in regard to details being, however, necessary on account of the more profuse discharges. In cases where the stumps are stitched into the vagina, they subsequently come away by sloughing. The vaginal tampon placed at the time of operation should be removed on the third day and an antiseptic vaginal douche given. Unless there be considerable oozing of blood from the wounds, the tampon need not be replaced. Sloughing of the stump begins to manifest itself in about four days by a gradually increasing and foul-smelling discharge. In the course of ten days or two weeks the sloughing stump will have separated, and the raw surface gradually heals by granulation and contraction. During the time of the suppuration the patient is mentally dull and sluggish; the temperature and pulse will be found slightly elevated, and there will be a loss of appetite evidenced. She is, in fact, suffering from a mild form of septic infection due to absorption of the purulent discharges from the wound. This discharge is the greater where catgut has been used, as is always the case where this material has been employed in plastic operations. For these reasons it is the more important, in order to secure the comfort and possible safety of the patient, that greater attention be paid to local disinfection and cleanliness. Vaginal douches should be used several times daily. Where silk has been used for ligatures and the stumps have been stitched in the vagina, the ends should be allowed to remain long, hanging from the vulvar orifice, so that when the sloughing takes place they may be removed by gentle traction. This traction should be applied daily with extreme care and gentleness until they have been removed.

If the operation be performed by placing clamps upon the broad ligaments, these should be removed within thirty-six to forty-eight hours, when all danger of hemorrhage will have ceased. The handles of the clamps are to be loosened, the blades gently separated sufficiently to dilate the track in which they are imbedded, so as to facilitate their easy withdrawal. If, in withdrawing them, resistance is met at any point, they may be rotated back and forth and in their long axis, great care being observed not to use more force than is absolutely necessary to free them. On their withdrawal a vaginal antiseptic douche is given, and a single strip of gauze carried to the cul-de-sac for the purpose of drainage.

Should a ureter have been included in either the ligatures or clamps during the operation, symptoms of uremia will quickly develop, and the patient in most cases will be lost. For the first few days it will be uncertain whether the patient is suffering from the shock of the operation, septicemia, or uremia. By the time the true cause of the trouble is determined with reasonable certainty the patient will probably be beyond help. The symptoms which will lead one to suspect this condition are a diminution in the quantity of urine passed, the elevation and rapidity of the pulse and temperature, the low mental condition, together with restlessness and anxious expression of the countenance,—all beginning early. The diminution of the quantity of the urine is the only one of all these symptoms pointing directly to the kidney as the seat of the trouble; and when it is considered that the amount of urine secreted after an operation is under all circumstances exceedingly small in the first twenty-four or forty-eight hours—often being less than twenty ounces in the twenty-four hours—it will be seen of how little practical value this symptom really is.

If the condition be diagnosed, the proper treatment consists in removing the clamps or ligature and freeing the ureters. Should the ureters have been cut in addition to having been clamped, their cut ends may be freed from the compressing force and turned into the vagina; if the patient recover, at a subsequent operation the ureters may be turned into the bladder or the corresponding kidney be removed. The extreme danger of hemorrhage following the removal of the forceps or ligatures sufficiently early in these cases to repair the damage, to say nothing of the even greater dangers of septic infection during the necessary and most difficult manipulations, renders total extirpation of the kidney on the affected side a much safer and more promising operation. If there is any uncertainty as to which side is involved, catheterization of the ureters is our only method of determining this question. This procedure is valuable in excluding the ligature of one or both ureters as a possible cause of the symptoms.

Should the bladder have been opened during the operation, and for any reason remain unclosed, great care should be taken not to allow any accumulation of urine. For this purpose a self-retaining catheter should be introduced, and retained in place until all chance of spontaneous closure is passed. If the opening remains permanently, subsequent operation must be made for its closure, it being treated in the interim as an ordinary case of vesico-vaginal fistula.

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